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AIR FORCE SPACE LAUNCH POLICY AND PLANS

HEARING

BEFORE THE

SUBCOMMITTEE ON STRATEGIC FORCES AND NUCLEAR DETERRENCE

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

FIRST SESSION

OCTOBER 6, 1987

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AIR FORCE SPACE LAUNCH POLICY AND PLANS

TUESDAY, OCTOBER 6, 1987

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES
AND NUCLEAR DETERRENCE,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

The subcommittee met in executive session, pursuant to notice, at 2:08 p.m., in room SR-222, Russell Senate Office Building, Senator J. James Exon (chairman) presiding.

Present: Senators Exon, Bingaman, Glenn, Wirth, Warner, Cohen, Quayle, and Wilson.

Staff present: Arnold L. Punaro, staff director; Carl M. Smith, minority staff director; Robert F. Bott, William E. Hoehn, Jr., Ronald P. Kelly, and T. Kirk McConnell, professional staff members; and Mickie J. Wise, staff assistant.

Also present: Jeffrey B. Subko, assistant to Senator Exon; Greg Weaver, assistant to Senator Levin; William J. Lynn, assistant to Senator Kennedy; Edward M. McGaffigan, Jr., assistant to Senator Bingaman; Milton D. Beach, assistant to Senator Glenn; William J. Wight, assistant to Senator Warner; James M. Bodner, assistant to Senator Cohen; Henry D. Sokolski, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; Alan Ptak, assistant to Senator Gramm; Samuel J. Routson, assistant to Senator Symms; and Peter D. Lennon, Appropriations Committee staff.

OPENING STATEMENT BY SENATOR J. JAMES EXON, CHAIRMAN

Senator EXON. The subcommittee will please come to order.

The Chair has been advised that Senator Thurmond will be delayed and he asked us to proceed with our hearing. He will join us when he can.

I have an opening statement to try to put the problems that we are going to be hearing about today into some perspective from the committee standpoint and for the record.

The Subcommittee on Strategic Forces and Nuclear Deterrence meets today for the first of what, I believe, will end up being a series of hearings on U.S. space launch policy.

My colleagues will remember only a couple of short years ago that it was the administration's policy to rely exclusively on the space transportation system, or space Shuttle, for all of our launches, both manned and unmanned.

The stocks of expendable boosters, like the Titan 34 and Atlas would just be allowed to run out, with no replacement.

Then, about 2 years ago, the Air Force wisely suggested that the Nation could ill-afford only a single launch system, and proposed a start on something called the complementary expendable launch vehicle, or CELV, now called the Titan IV.

The wisdom of that was made clear, first in the tragic loss of the *Challenger* and then in the loss of two successive expendables. This left the United States with essentially no capability to launch satellites.

The recovery from these disasters has been both time consuming and costly. But the Congress has been generous and responsive in providing funds for space launch recovery. But recovery is now well underway, and there are many competing claims on the defense dollar.

The lessons of this overreliance on the Shuttle have not been lost on the administration.

Our current space strategy is, and I quote: "The U.S. national space launch capability will be based on a balanced mix of launchers, consisting of the space transportation system, current expendable launch vehicles, and a new fleet of advanced expendable, partially reusable, and fully reusable vehicles."

But, as we will shortly hear from today's witnesses, the Air Force now proposes to go somewhat beyond this stated policy. The Air Force now proposes to abandon the use of the Shuttle for all satellite launches. Let me just say that this decision has major cost implications for the number of new launch vehicle types that we would need, for the number of ELVs on each type that we would need, and for the ELV manufacturing and launch capabilities we would need.

In addition, there is the small matter of what to do with all of the prepaid Shuttle flights that the Air Force has already bought, and what happens to this plan once the supposedly cheaper, advanced launch system becomes available.

The issue of cost is vitally important, as members of this subcommittee will understand. Our committee voted this year to emphasize conventional modernization at the expense of strategic modernization. As a result, this subcommittee had to reduce the President's budget request by over $4 billion. I expect this trend to continue in fiscal year 1989 and later years.

I am told by the committee's budget people that, if we were to be successful in achieving zero real growth in the defense budget over the next 5 years, the Air Force would have to reduce its current 5-year defense plan by over $100 billion, in order to make ends meet.

But even that is not the full extent of the Air Force's problem, since they have several very expensive strategic programs coming on-line over that same 5-year period—systems like the ATB, the ACM, the Midgetman, the rail-garrison MX, the SRAM II and the ASAT.

Can the Air Force afford these strategic modernization programs and all of the other strategic C^3 and satellite programs,. and still afford to have four new space booster programs? That is a question.

Can the Air Force afford to abandon the use of the Shuttle in launching satellites?

Can the Air Force afford to make major investments in production and launch facilities for current, expensive ELV's when a cheaper advanced launch system in on the drawing boards?

On that note, with all of those questions, let me welcome today's witness, the Honorable E.C. Aldridge, Jr., the Secretary of the Air Force.

Mr. Secretary, we look forward with great interest to your briefing, and we hope that you will shed a lot of light on all of these questions and these issues. We will hear from you in just a moment.

But first, let me invite Senator Wilson, who is representing the ranking member at this time, for any comments that he has to make. I will recognize him in just a moment.

Let me also tell the other members of the committee who are here presently that if they have some statements to make before we begin with our briefing by the Secretary, they will be recognized as they seek recognition.

With that, I recognize Senator Wilson for any comments or opening statements that he might have at this time.

Senator WILSON. Thank you, Mr. Chairman.

Let me thank you and Chairman Nunn for the very prompt response that you have made to the request that I made just days ago, that we have this hearing, this series of hearings, as it may develop, at the earliest possible date in order that we not lose more time in attempting space launch recovery.

Without dwelling at great length upon what I think all members of this subcommittee know all too well, we are trying to do just exactly that, to make up for lost time. Time was unavoidably lost as a consequence of the *Challenger* tragedy and the amendment which I have brought in the course of the authorization bill, and then withdrew, did, in fact, I think require these hearings.

We are delighted to have the Secretary and his staff with us today. But I do want to make clear my gratitude to you in particular and to Chairman Nunn for the promptness of this response.

I think your opening statement has asked all the tough questions. Without adding more, I would be happy to yield the floor to any other member of the subcommittee who may wish to make some sort of opening statement, and then I would look forward to hearing from Secretary Aldridge.

Thank you.

Senator EXON. Senator Bingaman.

Senator BINGAMAN. Thank you, Mr. Chairman. I really do not have an opening statement. I am interested in hearing from the Secretary as an explanation for what the Air Force is doing.

Senator EXON. Senator Glenn.

Senator GLENN. Same here. I have no further comment at this time.

Senator EXON. Senator Wirth.

Senator WIRTH. It is nice to be here, Mr. Chairman.

Thank you.

Senator EXON. Thank you very much.

As I said earlier, Mr. Secretary, we are very glad to have you here. It is an involved and complicated program that we are going to be working with you on.

Please proceed in any fashion that you see fit.

STATEMENT OF HON. EDWARD C. ALDRIDGE, SECRETARY OF THE AIR FORCE

Mr. ALDRIDGE. Thank you, Mr. Chairman.

I have a statement which I have provided for the record. What I thought I would do today is to try to summarize that statement and a series of briefings, which, I guess, is typical of the Pentagon's approach in presenting its case.

Before I start, let me just say that, as you well know, 2½ years ago, when we came before the Congress to start a little program of only 10 complementary ELVs, it was not a very popular event. There was a lot of personal abuse that I took with even suggesting such a "terrible" idea as that. But, because of the persistence of the Congress, we are, in fact, about 2 years ahead of where we would have been if that program had not been approved.

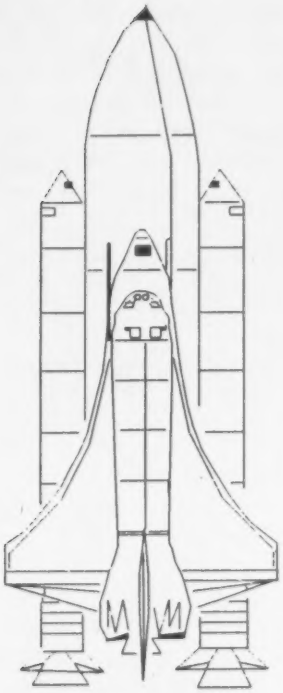
Unfortunately, since that time, we have had a series of accidents with *Challenger* and unfortunately two Titan failures, the first of which occurred in 1985, which was the first Titan failure from Vandenberg Air Force Base, in 18 years of flying Titans. So it was quite a tragedy. An unexpected event.

What I would like to do today is to give you an update of where we stand on launch recovery.

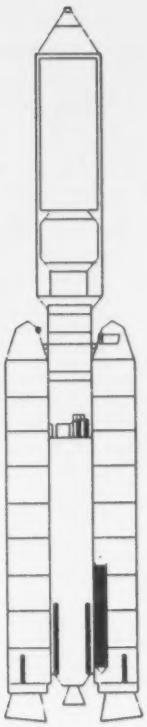
As you know, through the great help of this Congress, we did get some significant funds approved for fiscal years 1986 and 1987, right after the *Challenger* accident, to begin the process of recovery.

Unfortunately, there have been changes that have occurred, even since that time. What I would like to do today is to tell you where we were at that time and then update you on where we need to go in order to fully recover from the situation we have today.

May I have the first chart, please.



SPACE LAUNCH



No, the next chart.

THE PROBLEM

Previous budget submissions—resolved many problems.
More fixes required:
Additional Shuttle slips/launch rate reductions.
Additional performance losses.
We have no option but to fix them—the purpose of today's briefing.

Senator EXON. May we dim the lights a little bit, please.

Mr. ALDRIDGE. Mr. Chairman, as I mentioned before, the problem that we see today was not known in 1986. We submitted in the previous budget submission some fixes to the recovery program as a result of the *Challenger* accident and the Titan failures. They resolved many of the problems that got us started on the major program. However, there have been some additional impacts to our recovery plan and more fixes are now required.

The sense of what has happened is: at the time we submitted the fiscal year 1988 budget, we made the assumption that the Shuttle would be down about 18 to 24 months. It now looks like it will be down for 30 months, and it could be down even longer than that.

In addition, NASA has reduced the launch rate of the Shuttle, to the point where the rate that was assumed at the time of the budget submission is going to be less than is now planned. We have to take some additional actions.

We have also had some performance losses. At the time the budget was submitted, the assumption was that the Centaur was still on the Shuttle. NASA made a decision that cancelled the Shuttle Centaur program, and we have had to remove certain pay-

loads off the Shuttle because of that decision. Also there have been other losses which have caused us to make some additional changes.

The problem, Mr. Chairman, is these are not satellites that we can wait to launch. These are operational replacement satellites to existing on-orbit capability and some new capabilities, which are identified as essential for the national security mission. We must launch these systems, and the only option we have is to pay the price to do so.

That is what I am going to talk to you about today.

May I have the next chart, please.

OPERATIONAL IMPERATIVE

Launches replace degrading existing capability or provide new on-orbit capability.
Delay in launch will preclude a reliable missile warning capability or arms control verification capabilities.
Waste of billions of dollars in capital investment is unacceptable.

The imperative, as I mentioned, is that these are not satellites which we can wait to launch. These satellites shore-up degrading capabilities, which have been on-orbit.

Let me make just one point here.

The performance of our on-orbit satellites during this crucial period have been absolutely outstanding. The quality of our contractor team who built our satellites has saved us from a national security disaster. Many of these satellites, which normally would have been replaced by now with Shuttle or expendable launches, are lasting longer than their lifetime expectancy would have been, and they are performing much better than we expected. So, our on-orbit capability has saved us from having some real problems in accomplishing our national security mission.

We have identified very important and new capabilities that need to be launched to meet our national security requirements. I will show you those. Unfortunately, some of the satellites that I cannot discuss go into classifications even beyond this hearing.

Senator EXON. Mr. Secretary, I will tell you and should advise the staff that we are at the secret level. Some of the members may wish to go into things which you have properly indicated that you could not talk about at this classification.

I just want to tell everyone that we are now at the secret level. We are ready to go and prepared to go very shortly to codeword, if we have to, to discuss some of the things that you just referred to.

So I think there should be no hesitancy on the members to inquire into any of this as they see fit. I think there probably is nothing more that is going to make harder choices for the members of this committee than what we are launching into today, and the quicker we understand as best we can everything about it, the better off we all are going to be.

So, when you feel that we have to go to codeword level, would you please let me know. I think we are cleared for that now, but we would want to make one more check.

Mr. ALDRIDGE. We are not cleared on our side, sir. But I think I can describe, in general terms, the characteristics of those satellites without having to go into the details of it. I could certainly go into the details with individual members as they see fit.

The main discussion on this is that these spacecraft represent operational capabilities, and, of course, they are worth billions of dollars. We have already spent money to buy these satellites. The question of just keeping them sitting on the ground—waiting—is really not an acceptable alternative for us. We must pay the bill to get these satellites launched.

Next chart, please.

SHUTTLE IMPACTS TO DOD

EVENT	RESULT
● CHALLENGER ACCIDENT	● +30 MONTH SLIP
● PERFORMANCE LOSSES	● – 16,000 POUNDS VANDENBERG STANDDOWN
● SAFETY CONCERNS	● NO CENTAUR UPPERSTAGE
	● REDUCED FLIGHT RATE
	● PAYLOAD DESIGN IMPACTS

As I mentioned before, the Shuttle is having an impact on the Department of Defense, and in very significant ways, as a result of the *Challenger* accident. We are now looking at a 30-month down time. The expectation now is June 1988, before the next Shuttle will be launched from Kennedy. There is still some speculation on whether or not NASA will meet the June 1988 schedule. Right now, we have no information that would preclude them meeting it, but that is still considered to be very tight and very optimistic by NASA. It could go beyond that point.

Senator EXON. Let me stop you right there.

Just within the last 10 days, did you not have a test that indicated that they may have solved the main problem?

Mr. ALDRIDGE. That was a little longer than 10 days ago, sir. But they did have a full-up test of the new design solid rocket.

Senator EXON. Was that all positive?

Mr. ALDRIDGE. Yes, sir. Everything looked very good on that point.

The problem is not so much getting the testing done, but building the flight hardware to meet the June 1988 flight date. They will have to deliver to Kennedy in December of this year two flight

sets of solid rocket motors. They have to be delivered before the testing of flight hardware is completed.

Now, the question is can they make that kind of schedule, that type? They claim they can. Right now, we have no reason to doubt that they can. That is the assumption that is made for the June launch, and that is the 30-month slip.

We are hedging against the possibility of it going longer than that.

Shuttle performance losses—as part of the Shuttle recovery, they have canceled the solid rocket-motor filament-wound casing upgrade to the Shuttle, and the 109 percent rated thrust improvement to the Shuttle main engines. For Vandenberg Air Force Base, Shuttle launches that has reduced our flight capacity by 16,000 pounds. The Shuttle is no longer capable of lifting any Department of Defense payloads from Vandenberg with that weight reduction.

So, therefore, we had to stand down Vandenberg to caretaker status, pending the improvement of the Shuttle performance and return of the 16,000 pounds loss. But, in the meantime, we have to take the payloads that must fly from Vandenberg, put them on expendable launch vehicles, and fly them out of existing facilities.

Senator GLENN. Why is that again? I did not get the reason for the 16,000 pound requirement?

Mr. ALDRIDGE. The requirement for Vandenberg launches is to get to a polar orbit. When you launch polar you do not get the advantage of the Earth's rotation which gives you another 1,000 miles per hour in equatorial speed. Shuttle could launch about 6,500 lbs. to orbit from Canaveral but less than 30,000 from Vandenberg. The hotter engines and filament casings were needed to meet west coast requirements.

Senator GLENN. This is a change after the *Challenger,* then?

Mr. ALDRIDGE. This is after the *Challenger* accident?

Senator GLENN. What is changing that?

Mr. ALDRIDGE. There were two performance improvements that were planned for the Shuttle. One is the filament wound cases, the light weight cases on the solid rocket motors. Those are now pushed back in time.

The other is that they have fallen off the rated Shuttle main engines level of 104 percent rated thrust. To fly the payloads out of Vandenberg, we need it at 109 percent and the filament-wound-cases.

These have now been deferred for the Shuttle program until the recovery is complete. That reduced the payload capacity from Vandenberg (with a few other safety margins in there) by 16,000 pounds. That is one-half of the capacity that we had originally anticipated from Vandenberg.

Senator WILSON. Mr. Secretary, are you still committed to a shuttle capability out of Vandenberg?

Mr. ALDRIDGE. Currently, we have no plans to fly the Shuttle from Vandenberg but we have kept the facility in a caretaker status, so that when the requirements do come up, we can reinstitute. We have not foreclosed the option of bringing Vandenberg back on-line.

It is still there as an option.

Senator WILSON. But you have no further or present plans to do so?

Mr. ALDRIDGE. No, sir.

We have no plans through the 1995 period to do so.

Senator EXON. Are you telling us, Mr. Secretary, that after all of the experiences we had with shuttles which all went off without a hitch until the terrible tragedy that we are going to end up with a shuttle that has half the payloads that we did before? Is that what you are saying?

Mr. ALDRIDGE. This is out of Vandenberg.

Senator EXON. Just out of Vandenberg?

Mr. ALDRIDGE. Just at Vandenberg.

The reduction at Kennedy is an 11,000 pound reduction. That is based on the 109 percent engine, and some additional weight increases due to the redesign of the solid rocket motors and the weight increase because of the escape system that will go on the Shuttle.

So we are down from 65,000 to about 54,000 pounds from Kennedy. It is still adequate to launch some of the payloads, but not all of them.

In addition to that, NASA canceled the Centaur capability on the Shuttle. That was a capability that we needed for DOD and that NASA also needed. They took the Centaur capability off the Shuttle, which meant that we had to remove more payloads from the Shuttle onto expendables so that we could launch them.

Senator COHEN. How many DOD launches are anticipated after the 10 that you want to shift to the ELV?

Mr. ALDRIDGE. I will show you a chart of our current plan, with Shuttle and expendables, in just a second, sir.

The whole mission model for DOD after we implement this plan I will show you in a moment.

NASA canceled Centaur. That means that we had to put the Centaur on Titan and move some payloads off the Shuttle. The flight rate says we are now competing for more capacity. So we have removed some more payloads from the Shuttle, and there are some design impacts that we have to pay for as we move payloads from the Shuttle and improve our safety margins on some of the payload capacity.

May I have the next chart, please.

THE NEW STRATEGY

- USE THE SHUTTLE ONLY WHEN NECESSARY
  - MAN INTERFACE
  - COST/SCHEDULE DRIVEN
- REINSTATE STRONG ELV PRODUCTION BASE
  - MULTIPLE VEHICLES
  - COMMERCIAL COMPLEMENT
- BUILD THE COMMENSURATE FACILITY INFRASTRUCTURE
  - NEW/MODIFIED PADS
- PURSUE CRITICAL TECHNOLOGY INITIATIVES
  - RELIABILITY
  - CAPABILITY/CAPACITY
  - LOWER COSTS

Our new strategy therefore, after all of this is put together, is the following.

For the Department of Defense, we would use the Shuttle only when necessary, when there is a manned requirement. Where the Shuttle is unique in its ability to fly the payload with a manned interface, we will maintain those payloads on the Shuttle, or, when it is not feasible in terms of cost or schedule to do otherwise.

There are some payloads that are already integrated on the Shuttle, waiting to fly. It would not be appropriate for us to take those off and put them on expendable launch vehicles because we have already paid the price and we will just wait until the Shuttle is ready and fly them. We have those, and I will show you those in just a minute.

So, what we have basically done is remove all of those payloads that did not require a manned interface. They can fly on expendables, that would now allow the reduced flight rate for the Shuttle to be used for missions, scientific and technical missions, where man is absolutely essential to flying the missions, and now DOD has removed much of the pressure on the Shuttle for those kinds of payloads.

We have been asked by NASA to remove as much as possible off the Shuttle to permit these payloads to fly at the appropriate time.

That is what our strategy is. We are reinstating a strong, expendable launch vehicle production base with different types of vehicles, and we have also very appropriately instituted a very strong commercial ELV industry, because the Department of Defense is continuing with the Titan IV and we went out with a competition

for what we call a medium launch vehicle. The McDonnell-Douglas Delta II won and is now in competition with other launch vehicles for commercial launches.

We have the Titan II program, which we are using for small payloads. Martin Marietta has now gone out under a commercial bid and is using the old Titan III for a commercial launch possibility, and General Dynamics Atlas/Centaur is also in the running.

So, as a result we are building up the expendable launch vehicle industry. We have instituted a fairly strong commercial industry, and we are going to conduct another competition which I will talk about in just a moment.

Senator EXON. Senator Glenn.

Senator GLENN. On interface, that is a very, very key decision, as I would see it, because, originally, we thought we could put multiple loads on the Shuttle and go up, and whether they required a manned interface or not, we could put multiple loads in, and it was going to be a cheaper launch if it was not going the ELV route.

Now, it would seem to me, once the Shuttle gets to flying, that rationale is still there. They can do it that way, whether there is a manned interface or not.

Now, if you make an arbitrary decision that unless the systems have to be checked out by people on board—because those will be the only ones put up in the Shuttle—that is a very, very major change and a very, very expensive change, I would think.

Am I wrong?

Mr. ALDRIDGE. Yes, sir.

Senator GLENN. I am wrong?

Mr. ALDRIDGE. The cost of the Shuttle has now gone up to exceed the price of the expendables.

Senator GLENN. Do you mean even on the multi-loads launch for the Shuttle?

Mr. ALDRIDGE. Yes.

We can now launch multiple global positioning satellites, as an example. We are planning to fly two GPSs per Shuttle mission, along with a third mission, for the two early Shuttle missions. We are still going to do that. But at the end, or toward about the 1991–1992 timeframe, when we have a Delta II, we can put up a GPS for $35 million on a Delta II. That is less expensive than paying the pro-rated share of the Shuttle ride in the Shuttle bay. NASA has now given us a number for a Shuttle ride cost of $250 million a ride.

Senator GLENN. For the whole bay?

Mr. ALDRIDGE. Yes, sir. For the taxpayer. That is the cost to the taxpayer. Because of the ongoing DOD contribution to Shuttle, we would pay $115 million for the entire bay.

Senator GLENN. How many vehicles of that type would you put into orbit with the whole bay?

Mr. ALDRIDGE. We believe we can put two of them up, two GPSs per flight, along with a smaller third mission.

We still plan to do that on some of the originals.

Senator GLENN. You now have nine prepaid flights?

Mr. ALDRIDGE. Yes, sir.

Senator GLENN. Would those go down to two?

Mr. ALDRIDGE. No, sir. Let me show you that.

We are still going to use all nine flights.

We have an agreement with NASA that we have already prepaid for nine flights, and we will fly them. In fact, we will probably fly more than the nine flights, but the DOD rate will be a lot lower than we had previously planned in the past.

Senator GLENN. That, as I understand it, gets over into the SDI program, doesn't it?

Mr. ALDRIDGE. There are some SDI experiments, and there are some other missions that we really don't know about in the out-years that we may want to fly with military manned space experiments.

But those are the ones that require men, not those which do not.

Senator GLENN. I understand.

I just think everybody should be aware that that decision there, to go only with those requiring "man" in the loop, is a very major decision.

Mr. ALDRIDGE. Or those missions which are cost or schedule driven. If I found a case in which it is less expensive for me to fly the Shuttle than it would be for me to fly expendables, then we would continue to fly the Shuttle. But right now, with the Shuttle cost increasing it's not the case. We just made a new agreement with NASA, just about a week or so ago, in which the Shuttle ride cost to DOD is $115 million per flight, and that is where we share the expenses of the launch operations.

That is up from $86 million from our previous agreement. The increase per flight charge that is because the flight rate now has been decreased.

We want to reinstate a strong ELV production base to meet DOD requirements with a multi-vehicle fleet, and, of course, also accomplish the commercial complement that I mentioned. We need to build the launch infrastructure that is necessary to go along with this, and we want to continue to pursue technology initiatives, such as the advanced launch systems, or any improvements to these capabilities, so long as they are cost effective and provide lower costs to get to orbit. We plan to do that.

May I have the next chart, please.

NEW LAUNCH STRATEGY
WHAT IS REQUIRED?

- **TITAN IV**
  - BUY 25 MORE BOOSTERS
  - ENHANCE PRODUCTION RATE
  - MODIFY SECOND LAUNCH PAD AT ETR
  - ENHANCE LAUNCH CAPABILITY
  - SUSTAIN PRODUCTION IN OUTYEARS
- **MEDIUM BOOSTERS**
  - NEW COMPETITION FOR DSCS BOOSTERS
  - FLY ADDED DELTA II BOOSTERS
  - SUSTAIN PRODUCTION IN OUTYEARS

What all this means in terms of the near term is we need to buy 25 more Titan IVs than the 23 which have been currently authorized for us to procure. That increase continues the production base and adds to our capabilities. As a result of the slippages and as a result of the reduced launch rate, we need to increase our launch capacity, and that is what we propose to do—here, by launching 25 more Titan IVs through 1995.

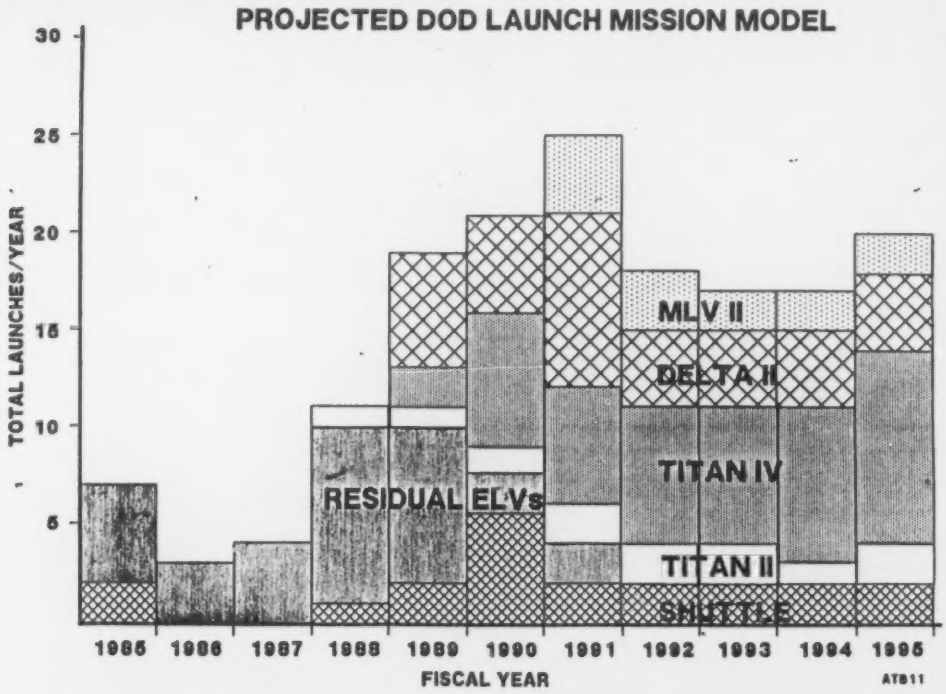
We need to increase the production rate, and I will show you how we will do that.

We need to modify another launch pad because we do not have enough pad capacity. We will modify one at the Eastern Test Range at Kennedy. We will need the enhanced launch capability to meet that rate, and we want to sustain production in the out-years. We see that continuing to go on through the 1995 period.

In the medium booster area, we had already held a competition and selected the Delta II. We need to fly a few more Delta II boosters because of the Shuttle delay, but we also need to take the DSCS satellite off the Shuttle, to take that pressure again off NASA. We see the need to compete for a new medium lift booster, which

would be less costly than flying the DSCS on the Shuttle, and we will need to sustain that production in the out-years. I will show you this in a few moments.

May I have the next chart, please.



What all this means is when I put all of this together—and this is the chart, Senator Cohen, that you were looking for—we start back here in 1985. These orange blocks are the residual expendables that we now have. These are the old Titan IIIs, the Atlases that we currently have in the inventory and plan to fly out.

The Shuttle, which has now been down—we show a buildup of the DOD Shuttle rides out to about five rides in fiscal year 1990. Of course, in 1989 there are two. There is one here in 1988, and then two per year after 1990.

So we would use up the nine flights and continue at a rate of about two per year.

Now, let me caveat this. This is all that had been identified to us in the 1991 through 1995 period. A lot of people have been reluctant to do as SDI has done and look for experiments for the Shuttle that have a manned interface.

That number will probably increase for the Department of Defense beyond the two per year. But that is all that had been identified so far.

The Titan IIs will run at about two flights per year for small payloads and unique orbits out of Vandenberg.

Titan IV will build to about 10 flights a year by the end of the 1995 period. This is the Delta II rate which will run about six to eight flights a year initially and about four per year thereafter. This (indicating) is the new, competed medium lifter, which also would give possibility for more commercial applications.

Senator COHEN. Before you move on, may I inquire why the Air Force decided to go with a medium launch vehicle (MLV II)?

Mr. ALDRIDGE. The Delta II or this new one (indicating)?

Senator COHEN. The new one.

Mr. ALDRIDGE. Yes, sir.

Senator COHEN. As I understand it, it cannot launch the DSCS satellite, is that right?

Mr. ALDRIDGE. That is not true, because I have not decided what it is because I want to go into competition to launch the DSCS satellite.

The Delta II cannot.

So, this is a competed program.

Senator COHEN. Has Delta II been selected yet?

Mr. ALDRIDGE. Yes, sir.

That was competed on the basis of launching the global positioning satellites, the smaller satellites, to 11,000 nautical miles.

Senator COHEN. So, if you had the Titan III or the Centaur, you would not have had to go to the new Delta II?

Mr. ALDRIDGE. No. I competed Titan III, Delta II, and Atlas Centaur for that mission, and Delta II was selected on the basis of the least cost.

Senator COHEN. Even though it cannot carry the DSCS?

Mr. ALDRIDGE. It cannot carry the DSCS because at the time we did GPS, DSCS was not a consideration for launching on the MLV II. [Deleted.]

Now, I want to compete MLV II because of [deleted]. Now I am going to recompete for the DSCS launch vehicle.

I am going to allow Delta II, Atlas Centaur, and Titan and anybody else to compete for the DSCS satellite in the same type of competition as the original MLV. Except that DSCS is heavier, and there may have to be some improvement in Delta II or some modifications in the Atlas Centaur or Titan to be able to do the job.

DSCS is a different size satellite. It goes to geosynchronous orbit at 22,000 miles, as opposed to GPS which goes to 11,000.

Senator COHEN. Well, then, the point I am making is this. Could Titan III or Centaur handle the DSCS?

Mr. ALDRIDGE. Yes, sir, and they will be asked to compete for that job. We will select the most cost effective solution for that.

We have also asked if they want to propose a commercial launch for us. We would accept that as well.

Senator COHEN. There is some question of whether or not the Air Force really has as one of its major goals the benefit of subsidized commercial industry—would that violate the administration's stated policy?

Mr. ALDRIDGE. Absolutely not. That is not my job, to subsidize commercial industry.

Senator COHEN. Apparently on the House side, there was testimony by one of the leading industries which said yes, this development of the Delta II would, in fact, be very beneficial.

Mr. ALDRIDGE. Absolutely. It gets us into a commercial space launch industry. But it is not a subsidy.

In effect, what we have done is we have bought the most effective booster, the most cost effective booster, to launch the GPS.

Now, we have given them a production base, just as we have with Titan, to enter the commercial market. But it is their decision to do so. We are not subsidizing. In fact, I have been criticized for not subsidizing the commercial industry.

Senator COHEN. I was just wondering what the policy was.

Mr. ALDRIDGE. The policy is that we do not subsidize, but we do encourage a commercial ELV industry to compete with foreign governments. I think it is a good policy for us to follow.

Senator GLENN. Mr. Aldridge, may I ask you this question: does NASA concur with all of this?

Mr. ALDRIDGE. Yes, sir.

Well, let me say this. Up through this part here, up through about 1990, which is all their 3 year manifest covers, we have all basically agreed that they can handle these DOD missions.

Jim Fletcher has written me a letter and asked me to pull off more DOD satellites beyond that time, so that they can have more room for scientific missions.

What our DOD program does is accommodate his request in the out-years.

Senator GLENN. The reason I was asking is in this year's budget, we put language in there very specifically that says that none of the funds can be obligated or expended until the Secretary of Defense, with the concurrence of the administrator of NASA, has submitted to the committees certification which includes the following: an agreement between Defense and NASA on the most effective design, the design approach for this, for ALS, and on a joint program, Office of Management plan to implement it, and expertise in NASA and a detailed description of the ALS management plan and the roles of both to be performed.

Mr. ALDRIDGE. Yes, sir. That is for the advanced launch system.

Senator GLENN. Well, isn't that what we are getting into here?

Mr. ALDRIDGE. No, sir.

Senator GLENN. We are talking about the ELVs and the MLVs.

Mr. ALDRIDGE. That is a program that gets into an advanced launch system and gets out into the mid-1990s. That is a specific program, not dealing with what we are launching now.

These are programs which are launching satellites that we have already developed and have already begun procurement for. It does not include the advance launch system program, and we do have a program coming back to you on the advanced launch system. That is beyond this, beyond the current timeframe.

Senator GLENN. I have one other question, Mr. Chairman.

You talked about the $115 million or whatever it was, per launch, with NASA on the Shuttle. I want to be certain of the other costs here, with the ELVs and the MLVs and so on. But there will also be a lot of additional facilities that will have to be built for those.

Did you figure all of this into the costs? The capital costs involved I think would be a major figure.

Mr. ALDRIDGE. Yes, sir, we did—not only the capital costs, but also some production increases, to keep the production rate of the ELVs up. I will show you both of those.

Senator WIRTH. Mr. Secretary, who is going to be flying the Shuttle with the $250 million payload?

Mr. ALDRIDGE. Only those people who absolutely have to have it manned, or in some cases where I could fly as a Shuttle ride, where I could put a payload in there, where it would take me only a very small part of the Shuttle bay, and get an inexpensive ride.

Senator WIRTH. Having to have a man in the loop, then, lowers the number of Shuttle flights, and the cost, in turn, is going to go up, isn't it?

Mr. ALDRIDGE. Yes, sir.

But let me tell you that for the Shuttle, there are more payloads to fly the manned Shuttle than there are Shuttle rides to fly, and that is for quite some time.

We have a tremendous backlog of payloads waiting to fly on the Shuttle that are scientific, such as the planetary missions, that need to fly. They are putting pressure on DOD missions, here in front, that also have been sitting on the ground.

NASA would like very much to get as many DOD missions off the Shuttle, so long as there are the ELVs available to permit those Shuttle spaces to be used for payloads that have already been backlogged.

Senator WIRTH. I might ask another question.

As worked out, is it going to be as cost effective or more so, for you to compete the MLV rather than go to Delta or Titan IV.

Mr. ALDRIDGE. Delta II will not solve, will not meet the MLV II/DSCS needs. But, there is an option for a Delta III that might do this, but that takes some R&D money.

The Titan III, which is a commercial version of the Titan, could in fact, do this job and the Atlas Centaur could also do that job.

I don't want to just sole source it to someone when, in fact, there are people out there who could compete for the job. I want to keep the competition going.

Senator COHEN. One final question, please.

What about trying to make the satellites compatible with the ELV? Are they all going to be compatible with the ELV and the Shuttle, or are you just taking a portion of them?

Mr. ALDRIDGE. Senator Cohen, I tried to do that before, and in fact we did it. [Deleted.] But, unfortunately, some satellites aren't what we would like them to be—and I will give you an example. Milstar. We would like to have Milstar dual-compatible. But Milstar requires a Centaur. The only launch vehicle for Milstar is Titan IV/Centaur.

There is no way that I now can make that dual-compatible because NASA will not put the Centaur on the Shuttle.

So, right now, I am single-string with Milstar and ELVs. I don't want to do that, but, unfortunately, the performance margin of the Shuttle has dropped and I no longer can do it for Milstar or many of the other payloads.

Senator COHEN. So, are we going to find ourselves in a situation where we are going to configure these satellites basically for the ELV and to do otherwise would be an enormously expensive job at that point?

Mr. ALDRIDGE. In some cases, I have some payloads, which I can talk to you about privately, which were designed for the Shuttle, that I would now have to put on the ELV. But I have to carry the additional weight of special tie-downs which are required just for

the Shuttle. I have to carry 2,000 pounds of additional weight on the ELV, that I would not normally have had to do—just to stay Shuttle compatible.

That ability is still there. But now, that payload cannot go back on the Shuttle because I can't launch it due to performance shortfalls.

Senator COHEN. The other question is what about the future? We are talking about designing the satellites. Are we designing the ELVs to be compatible with the Shuttle, or should we make a determination now that they should be compatible all the way, or that we should not even think about the design of the Shuttle?

Are we going to make that decision now?

Mr. ALDRIDGE. In some cases, we have already passed the point of making those decisions. When it comes up to the next satellite block changes, that is where those decisions have to be made.

I believe we ought not to get ourselves into the position, again, of being single string on any booster.

However, I think the solution is not necessarily to go back to make it only Shuttle versus Titan IV. We should think about building a satellite to be compatible with a launch system that could be either Titan IV or maybe an advanced launch system. The ALS is the new system that gives you that dual compatibility, so you will not be dependent upon that single strand.

Senator COHEN. Well, just to follow up on what Senator Wirth was asking you, if you start cutting down the number of Shuttle launches and then you start designing the satellites to go on ELVs, you are really writing off, for all practical purposes, the Shuttle for the future.

I mean, you don't have to say it. Just tell us about it.

Mr. ALDRIDGE. That is not necessarily the case.

The problem I worry about most is that the Shuttle does not have the performance we need to launch our satellites. If the Shuttle ever gets its performance back, we have satellites already designed to go on it. We've already made that decision, to make them all go on the Shuttle. Now we have had to take them and put them all back to go in ELVs. But they are not totally redesigned. They have been modified to fit the expendables launch vehicle.

They are still capable of going back on the Shuttle if the performance ever got back up to the point where they could launch our satellites. Some will never occur unless NASA decides, for example, to put the Centaur back on the Shuttle.

Senator COHEN. What about building the satellites that we are building today? Forget about the ones that we have in storage. What about the ones we are designing today? What are they being designed for?

Mr. ALDRIDGE. They are being designed for expendables.

Senator GLENN. Bill, will you yield?

Senator EXON. Gentlemen, please hold on for just a second. The Secretary has to leave at 4 o'clock. I started yielding for questions, but he has to leave at 4 sharp.

All I am going to say is, while I hate to cut this off, I would like to let him finish his presentation, and then we will proceed under the 5 minute rule. Otherwise, he will not finish his presentation by 4 p.m.

Mr. ALDRIDGE. Mr. Chairman, this is extermely important. I will stay here as long as you need me.

Senator EXON. What is extremely important—the 4 o'clock meeting?

Mr. ALDRIDGE. Well, we have plenty of time. We can make the 4 o'clock meeting without any difficulty.

Senator EXON. Okay. Then let me ask you this question.

If you were not interrupted, how long would it take you to finish your presentation.

Mr. ALDRIDGE. I have about four more slides and then I will be through. All the rest summarizes this.

Senator EXON. Well, then, it would be better to bring it out. If the questions are not absolutely essential to be asked at this time, let's let him finish his presentation and then have the questions.

Mr. ALDRIDGE. I will try to be as quick as I can.

As you see, we are getting up to about 20 launches a year, back to where we were about 1965 or 1970.

Senator EXON. What year is that? I cannot see the numbers.

Mr. ALDRIDGE. This is 1990, right here. This is the fiscal year 1990, and this is 1991. It shows the tail-off. But these tend to flatten out with time, as satellites get slipped a little bit.

May I have the next chart, please.

TITAN IV MISSION MODEL

PROPOSED FY 1989–95

[Deleted.]

This shows the Titan IV model that we currently are pursuing, that which is at Kennedy, and this—again, this is a secret chart—this is the Defense Support Program, [deleted]. This is Milstar, a very important strategic command, control, and communications.

This is the Boost-phase Surveillance and Tracking System, [deleted].

That is the basic model. These are not discretionary satellites. These are all operational satellites, and [deleted].

If we do not fund this program, what I have to do, because there is no room on the shuttle for launching these, is they have to slip. So, without the funding necessary to get this program done, these programs are slipping with time, rather than being able to be launched on schedule.

I show two launch pad milestones.

This is the upgrade of a Titan launch complex at Cape Canaveral. Here is the one at Vandenberg (indicating), which we will have to do as well.

May I have the next chart, please.

MEDIUM LAUNCH VEHICLE MISSION MODEL

PROPOSED FISCAL YEAR 1988–95

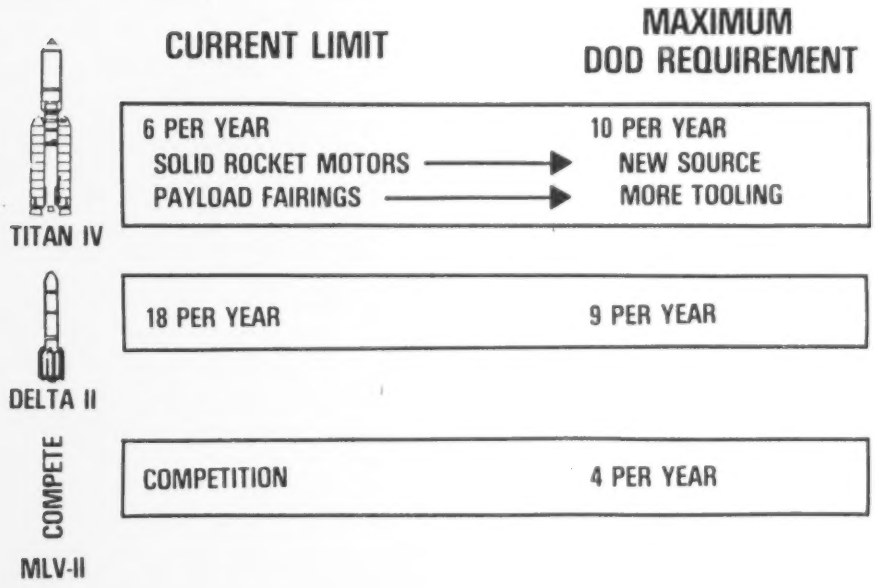
[Deleted.]

These are the medium launch vehicles that we talked about. GPSs must be launched at a high rate to get the constellation up, and some will be launched on the Shuttle at the same time as this in the near-term.

There are a few special test programs and SDI small missions. DSCS is here requiring the MLV II, the competition that I talked about. We will also compete for launch of some of these SDI experiments. [Deleted.] That is the Titan II launch model. Here is the weather satellite and a couple of test programs. These are just small payloads for R&D purposes, and the NROSS is the Navy satellite—again, operational for a small number of R&D satellites.

Next chart, please.

BOOSTER PRODUCTION CAPABILITY



This is production capacity for the Titan IV. We have a capability to build six per year, but we need 10 per year. We will have to increase our solid rocket motor production capability through a second-source to get the production rate up to that required. We have a program underway to do that.

The Payload Fairing production capacity is only six per year. We will have to build some more tooling, and the cost numbers that I show you include the funds necessary to do that.

The Delta IIs, we can fly 18 a year, but we only need nine. So we are okay. And after the GPS constellation is established we will need about four per year, so we should be okay there.

So only in the Titan IV do we have to do some improvement.

[Slide deleted.]

On the launch pads, the two areas that are important for us are these. At Cape Canaveral, we basically have all the pads available, with Delta IIs. We are already modifying the Titan IV pad (complex 41). Money has already been provided for that and we will begin launching in 1989 from Cape Canaveral.

We are asking for a modification for one more Titan pad. That is, taking launch complex 40, which is right next to complex 41 (which

is used for the Titan IV) and building another mobile service tower to provide two pads for Titan IV at Cape Canaveral.

At Vandenberg, we already have all these pads. The Titan II pad is ready to go. We will launch in April next year, with the Titan II. The Titan IV pad will be under modification in 1988 and available in 1990. We have already included in a budget for 1989 another west coast pad for Titan IV.

We need two Titan IV pads on each coast to make the 10 flight per year rate. We cannot afford not to have those pads and still meet that rate without them.

That is what the pads will be.

For the STS, the west coast shuttle pad remains dormant at Vandenberg, but we will have two pads for the Shuttle at Kennedy. This plan will provide a fairly robust launch pad capability, as well as booster capability.

May I have the next chart, please.

SPACE LAUNCH RECOVERY
(DOLLARS IN MILLIONS)

	FY86	FY87	FY88	FY89	ESTIMATE FY90-94	TOTAL FY86-94
● ORIGINAL RECOVERY PROGRAM (AS OF DEC 1986)	660	961	583	955	2634	5793
● ADDITIONAL RECOVERY REQUIREMENTS	0	127	316	645	4779	5867
● NET LAUNCH RECOVERY	660	1088	899	1600	7413	11660

This is the unfortunate part of it, the dollars. The original program, funded as of December 1986, before we submitted the 1988 budget, was about $6 billion to carry that program through.

Now, because of new information, we need additional funds. Of the $127 million in fiscal year 1987, we need $112 million on reprogramming approval by the Congress to get this done right now. The remaining $15 million can be taken care of through other programs.

But we need $112 million of reprogramming, and we have asked for that authority.

Mr. Chairman, I really ask that that be done urgently. We need the money now to get on with these recovery programs—to get this thing carried on.

We need an additional $316 million in 1988, which is not in our budget, and $645 million in 1989, which is not in our budget. We will work the out-years during the Air Force POM exercise and budget review back in the Pentagon for fiscal year 1990, and beyond.

As you can see, the impact of this program, the accidents that have occurred, and the launch policy that we adopted in 1978, will cost the Department of Defense about $11 billion in unanticipated costs that we had not previously budgeted for.

This is what we need [indicating]. These two numbers are very important and the 1987 reprogramming is absolutely necessary.

The only solution if we do not get the reprogramming, is to slip satellite launches out. This is unacceptable. These launches have already slipped as a result of the 1986 Titan and Shuttle failures.

SUMMARY

Congress initiated recovery with fiscal year 1986–87 urgent supplemental.
Additional support required due to recent Shuttle changes.
Approve fiscal year 1987 reprogramming.
Provide for fiscal year 1988–89 needs.
Outyears to be worked in the DOD POM.
Transition to ALS needed to insure national launch capability into the 21st century.

This last chart is a summary. We have been very happy with your support in the past. It has been extremely timely and helpful to get our space launch recovery program underway.

Now, we need additional support in getting the reprogramming through. We need to work on getting the 1988–1989 needs. We will take care of the out-years in our POM, and, of course, we will be working on the ALS, which is the program Senator Glenn talked about.

We will be coming to you with a program that will put together how we transition from the current Titan IV, Deltas and others into an Advanced Launch System in the future. That is a program that we have to work with NASA on, and come to you with a recommended plan of how to get that done. But it is a 1995 and outyear program; it does not affect what we do in the near-term to get our current satellites launched.

These are new satellites. What we are looking for is to get the costs down.

Mr. Chairman, I know those last few charts went by very fast, but that is what we have to say today.

[The prepared statement of Mr. Aldridge follows:]

STATEMENT OF: THE HONORABLE EDWARD C. ALDRIDGE
Secretary of the Air Force

MR CHAIRMAN AND MEMBERS OF THE COMMITTEE:

I welcome the opportunity to inform you today about the total picture of America's national security space launch capabilities. While I bring a large measure of good news, we still have some significant challenges facing us. In particular, we need you to be aware of and support the need for additional Expendable Launch Vehicles (ELVs) and production and launch facilities. Your support will help us overcome the problems resulting from the current Shuttle down-time, its reduced flight rate, and the reductions in performance that are now projected. In order to put the situation in perspective, I will first describe our space launch recovery efforts. Then I will address the impacts of reduced space shuttle availability, and the launch strategy that we have adopted to ensure our ability to meet national security space launch needs now and in the future. I will describe the implementation of that strategy in terms of launch vehicle development, procurement and use. Finally, I will outline the nation's longer-term requirement for an Advanced Launch System.

By way of background, from the late 1970's through 1984, the United States had committed to rely exclusively on shuttles for space launch after the last ELV was used in 1990. However, by 1985 it was apparent that we could not accomplish all our space missions with assurance without complementary ELVs. The Congress supported this critical need, and as a result, these vehicles--which we now call Titan-IVs--are now in production. However, in 1985 and 1986 the Space Shuttle Challenger loss coupled with two Titan 34 failures unexpectedly compromised our ability to place critical heavy payloads in space. This series of accidents created a national crisis and undeniably confirmed the need for a national space launch strategy independent of any single launch system.

The Department of Defense, the National Aeronautics and Space Administration, the Congress, other government agencies, and the civil and commercial communities worked together to develop such a strategy--one intended to recover our launch capability and place it in a far stronger position to assure access to space in the future. The plan centered on the development of a mixed fleet of launch vehicles, and was based on several key guidelines. First, the Space Transportation System (STS) will remain an important element of our national launch fleet. Second, a number of DOD missions will be off-loaded from the Shuttle and moved to Expendable Launch Vehicles. In essence, the Shuttle will be used for national security missions that require the unique characteristics of the Shuttle, much as the President has directed for other non-defense users. To further promote assured access to space, additional launch facilities will be developed and maintained on both the East and West coasts. Finally, selected military missions will have "dual-compatibility". That is to say, these satellites could be put into space by at least two independent launch systems--the Space Shuttle or ELVs.

Clearly, this recovery approach required the acquisition of additional ELVs, as well as development and maintenance of a continuing industrial base for launch vehicle production and launch services. Thanks to the earlier support of the Congress, we have already made significant progress in this direction. Congress provided us with supplemental Fiscal Year 1986 and Fiscal Year 1987 funding for additional Titan IV boosters and new Delta II Medium Launch Vehicles (MLVs). The Titan IV boosters will allow us to meet our immediate national security needs. Additionally, the Delta II launch system we contracted for in January 1987 will relieve further demands on the Shuttle and allow us to deploy most of the Navstar Global Positioning System satellites considerably earlier than would otherwise have been possible. Thus, our national space launch recovery plan was well underway when we submitted the

Fiscal Years 1988-1989 President's Budget to the Congress early this year.

Since we formulated that launch recovery plan and submitted the budget, we have continued to work hard to quantify the total scope of the space launch recovery effort. As you know, we have already requested Fiscal Year 1987 reprogramming for completing the Titan-34D recovery, developing a Centaur upper-stage for use on the Titan-IV, and conducting nondestructive testing on the Titan-34Ds and Titan-IVs. However, the recovery situation has now been complicated: NASA announced on 22 May a delay in resumption of space shuttle flights until no earlier than June 1988. In addition, the Shuttle's maximum launch rate has been reduced to 14 per year. Finally, NASA has informed us that future Shuttles will carry lighter payloads. The result is that far fewer Shuttle flights will be in support of DOD. These changes have required us to expand our original launch recovery plan: we must now acquire additional ELVs and increase production and launch capacity to close the significant gap between national launch requirements and capabilities. Following an extensive Air Force assessment of our situation, we are now able to inform you about the impacts these requirements have on the Fiscal Year 1988-1989 budget.

Our specific needs are as follows: we must acquire 25 more Titan-IV boosters--in addition to the 23 Congress has already approved--in order to meet requirements through 1995. Seven Titans will compensate for reduced Shuttle availability between now and 1993, and two are required for new missions. The remaining 16 are for Fiscal Year 1994 and Fiscal Year 1995 requirements. We need not request funding for those 16 vehicles until the Fiscal Year 1990-1991 President's Budget. I'm informing you about them now because we must provide production and launch facility improvements in the near-term in order to begin building these boosters during Fiscal Year 1990.

Currently our Titan-IV supplier can produce six boosters per year. In order to accommodate our required launch rates through 1995, we need the ability to produce up to 10 Titan-IVs per year. Your support will provide this necessary increase to production capacity.

We will also need increased capacity at our East Coast and West Coast launch facilities to be able to meet our expected launch rates. We must modify one Titan launch pad at the Eastern Space and Missile Center at Cape Canaveral, Florida to allow six or more East Coast Titan-IV launches per year, while allowing the commercial Titan III program to continue simultaneously on a no-cost/non-interference basis. The need for a second Titan-IV launch pad on the West Coast was identified to the Congress earlier and is included in the Fiscal Year 1989 Military Construction request.

As I mentioned earlier, we are also faced with the need to off-load payloads previously intended for the Shuttle to Medium Launch Vehicles. In order to do so, five additional Delta-II boosters and 10 new MLVs will be required. The additional Delta-IIs will be acquired under the existing contract, and will be used to launch Global Positioning System satellites and a GPS-related experiment. We will conduct a competition for the remaining 10 MLVs or for launch services to launch Defense Satellite Communication System (DSCS) Satellites one-at-a-time. Significant benefits to the military, NASA and the commercial launch industry will accrue from this approach. First, DOD operations will face less risk from the possibility of additional slips to the Shuttle recovery schedule. We will gain flexibility for DSCS replenishment, and have the opportunity to substitute important, but less schedule-critical DOD Science and Technology payloads onto Shuttle flights. Further, additional Shuttle payload capacity and Shuttle flight opportunities would be provided to NASA since our plan to acquire additional MLVs could allow us to return Shuttle flights for NASA's

use in the 1991-and-beyond time period. Finally, the MLVs we need are the same class of vehicle that the emerging commercial launch industry will be producing. Acquiring additional expendable launch capability would strengthen that industrial base and improve the opportunities for success of commercialization. Acquiring more ELVs will be one more way both DOD and the Congress can encourage commercialization of space launch services.

In order to accomplish all the activities I've outlined above (including modifying Shuttle payloads to fit ELVs and accounting for savings from reduced use of the Space Shuttle), we request your support for adjustments to the Fiscal Year 1988 budget by $316 million and to the Fiscal Year 1989 budget by $645 million, and for special authorization should a prolonged Continuing Resolution be required. This support will enable us to implement our expanded launch recovery plan in the near to mid-term, and work-off the backlog of national security payloads by the early 1990's.

Beyond the near and mid-term, we remain concerned over the Nation's ability to deal with future launch requirements. The recovery plan I've outlined does not include any slack, or excess capacity through the early 1990's. It is just adequate to launch the minimum number of payloads we now know must be launched by 1995. For example, many of these payloads will complete constellations of multiple satellites and bring them up to the minimum prudent quantity for reliable operations. However, without slack the recovery plan is fragile because it allows no margin for error. If Shuttle or Titan-IV problems occur--and statistically this is not unlikely--a launch backlog will again accrue. The ideal solution to this Achilles-heel in the nation's space launch posture is to begin acquiring and phasing-in the next generation of space launcher, the Advanced Launch System (ALS). As ALS is phased into the launch inventory, the reliability of our launch capability as a whole will increase and launch costs will be-

gin a trend towards significant reduction. With a third heavy launch vehicle, we would gain the margin we need and could avoid schedule delays should problems occur with any single type of launch vehicle. In addition, we will have increased flexibility to provide for eventualities such as presently unforeseen launch requirements.

Although the ALS is currently under study by seven contractors and no specific design has yet been selected, we can still plan for our transition to this new launch system. The ALS program can be phased to provide a transition vehicle, ready by the mid-1990's, and a more capable objective vehicle, available by 1998. The transition vehicle would not represent a departure from the orderly path to the objective ALS. Rather, it would be composed of modules to be used in the objective vehicle--modules that can be built with current technologies and will be available before 1998. This transition approach has several advantages. First, it allows us to achieve our flexible launch vehicle inventory sooner. Second, it evens out the development costs by having the development work for the modular components of the transition vehicle done several years before those of the objective vehicle rather than simultaneously. Finally, for the transition vehicle we have set a goal to cut launch costs by one-half. The ALS will be the first vehicle designed with cost as the driving factor, rather than a specific performance. It is crucial to our space launch capability as we move into the next century.

Congress is aware of the national requirement to regain and maintain assured access to space, and has consistently supported DOD requirements. With Congress's continued support for Fiscal Year 1987 reprogramming and the current budget deliberations, DOD will be able to compensate for reduced Shuttle availability. In the longer term, Congressional support will enable us to begin using the ALS during the mid-1990's, and to develop ALS to its full capabilities for use during the next century.

The loss of the Challenger and ELV launch failures painfully underscored our Nation's need for a robust, balanced fleet of launch vehicles to assure our access to space now and in the future. The plan I have outlined will ensure the Nation will never again be faced with the situation we have coped with for the past twenty-one months. It is a necessary strategy to retain America's leadership in space.

Mr Chairman, I hope I have shed some light on the steps we must take to recover the capability to meet our national space needs, and the level of resources we'll need in the near-term. With Congress's help we have started on the road to recovery... with Congress's continued support we will complete the journey. This concludes my remarks.

Senator EXON. Let me say that if we are going to go to the 5-minute rule, I will begin.

If we proceed along the lines that have been recommended by you, according to the figures that we have, Mr. Secretary, you will need an additional $5.9 billion more than you had previously budgeted for fiscal years 1986 through 1994, or about roughly $6 billion more.

Is that accurate?

Mr. ALDRIDGE. Yes, sir.

I hesitate to make it too specific because some of the out-year money was not previously identified. We would still need some of that money in the out-years if we are going to fly on the Shuttle because we would have to pay Shuttle ridge charges that were not previously identified in our 5 year program.

Senator EXON. That is my next question.

I have here the DOD STS mission model view. You had in 1991 two Shuttles; in 1992, 1993, 1994 Shuttles, and then two down here under GPS. Those were Shuttle missions that I understand are going to go forward——

Mr. ALDRIDGE. Yes, sir.

Senator EXON [continuing]. And you are not going to use them to carry the payloads that you had previously planned.

Is that right?

Mr. ALDRIDGE. Well, sir, no.

We have now worked with NASA, and there is a new iteration coming up Friday. NASA and the Air Force have worked together, taking the three Shuttles that will now be available and trying to compromise on a mission model that meets as much of our demands and as much of their demands as possible.

We have reallocated those boosters to meet the requirements as we see fit.

They have agreed that they will credit us with nine flights, nine Shuttle rides. So the first nine Shuttle rides that are shown on our chart are already paid. In the out-years of course, we will have to pay for those additional rides beyond the nine. But those payloads that I believe you are showing there, we do have nine flights in the first——

Senator EXON. Are those a total of nine?

Mr. ALDRIDGE. Yes, sir, and those are all paid for already. That is an agreement that Jim Fletcher and I agreed to just 2 weeks ago.

I'm sorry, sir. Is that the question you had asked?

Senator EXON. I think that was the basic question.

These nine missions that you had budgeted previously are going to go forward and the payload is going to be satellites, as originally envisioned. Is that correct?

Mr. ALDRIDGE. Yes, sir, that is correct. Those are satellites that are sitting on the ground, waiting to fly today.

Senator EXON. That will go up on a Shuttle?

Mr. ALDRIDGE. That will go up on a Shuttle.

Senator EXON. The other program that you are talking about, that is going to be in the neighborhood of $5.9 billion additional between 1986 and 1994, is the carry-on—you were going to go beyond that?

Mr. ALDRIDGE. Go beyond that, yes, sir. That goes beyond that.

In fact, we have gotten approval for 23 Titans, and we are asking for 25 more. But those are Titans which will be funded in the out-years, not in the 1988 or 1989 budget time.

This is the additional cost, total cost that would be required as a result of the additional slippages and the reduced flight rate.

Senator EXON. Senator Bingaman, has he left? I believe he had a question? [Pause.]

Well, then, we will follow the early bird rule for our questioning.

Senator Glenn.

Senator GLENN. Thank you, Mr. Chairman.

I know that NASA feels it needs the Shuttle flights to make the schedule for deployments of the space station. We have some real concerns here about budget problems, with Gramm-Rudman-Hollings and all of the rest of that business, whether it is going to be on schedule in the budgetary situation that we have.

If those plans for the space station are slipped any at all, it would seem to me there would be a lot of Shuttle capacity available for DOD.

Now maybe we don't deal in slipped schedule. But have you considered that? Is NASA considering that?

Mr. ALDRIDGE. Yes, sir.

That is not necessarily true. NASA is very much concerned that, even if they get the space station, that they will not have sufficient capacity to meet their scientific needs, as well as space station needs, and that is why they are so interested in this so-called Shuttle C, as the additional cargo system that will meet their space station needs on top of the current Shuttle.

Senator GLENN. I am talking about the Shuttle C in just a second, too, and that will be an additional question.

You give high marks to the ALS. You did not get into it primarily here. But that was planned through fiscal year 1995. The plans through fiscal year 1995 assume no use of an ALS. The RFP for the ALS still asks for an interim capability only in the early 1990s.

NASA is also studying this for use by 1993. Now, if this, either of these, comes to pass in the early 1990s, is that going to provide another alternative for the Titan IVs?

Mr. ALDRIDGE. Yes, sir.

Senator GLENN. If everything comes through half-way on schedule, we are going to be building a lot of new things, a lot of duplication?

Mr. ALDRIDGE. No, sir.

I have the option, because Congress has not authorized the funds in the 1993–1994 timeframe. We could divert the funds that I have shown for Titan IVs if the ALS was available. We could, in fact, divert the Titan IV procurement funds to fund ALS. That option is still available to me.

But because I do not know when the ALS would be done or what the concept is at this time, until we have come together with NASA, I did not show it. But that would be available in the outyears, prior to the time that we would have to make a decision now.

Senator GLENN. If we had ALS in 1993, though, then your Titan IV; the production rates and launch rates, they would hardly be necessary, would they, if you get the approvals for ALS and stay on schedule?

Mr. ALDRIDGE. Well, sir, it is a possibility that that could be the case, but I would not bet on it at this point in time because I don't know what the ALS concept is.

You see, there is still some very high uncertainty whether in fact, you can build an ALS to get you the low cost system ultimately and also have a valid interim capability. That has yet to be defined.

I am not willing to bet on that at this point.

Senator GLENN. Let's assume that you get approval for the ALS to go ahead with that and are funding it. Let's assume that and that it stays in by the 1990s. Then it would make a lot of sense to stay on the Shuttle, it seems to me, for a lot of that capability, rather than buying a new, expensive expendable, to replace Shuttle missions.

Mr. ALDRIDGE. Sir, right now the expendable mission is probably about $30 million less expensive to fly than the Shuttle mission, and I don't need the manned system. I think the Shuttle missions are, in fact, booked up. I think we are saturated in trying to get Shuttle missions.

I am not trying to remove myself from the Shuttle. That is not the point at all. But I think in the case that we are showing here, the Shuttle missions are, in fact, saturated, and if we can take a DOD mission off the Shuttle and give NASA back some additional capacity to the Shuttle and then fly our mission on an expendable at less expense—that is the way to go.

Senator GLENN. What is being done to upgrade the Shuttle?

We assume in all of this that the Shuttle is going to be downgraded so that it cannot carry some of the stuff it was originally

scheduled to carry. What is being done to bring it back up to what it was thought its capability would be?

Mr. ALDRIDGE. Nothing, sir.

Senator GLENN. Nothing is being done to bring it back up?

Mr. ALDRIDGE. No, sir.

Senator EXON. Why is that, Mr. Secretary? I do not understand.

Mr. ALDRIDGE. That is the decision by NASA. They have postponed upgrades of the current Shuttle mission which could come from two programs that we had underway.

Senator GLENN. Wasn't that a budgetary decision, though?

Mr. ALDRIDGE. Senator, I think you would have to ask NASA. They were looking at not upgrading the Shuttle from its original capacity and going ahead with the Shuttle C or some heavy lifter. I think they made a decision that spending the money for a heavy lift vehicle was the way to go, rather than trying to upgrade the existing Shuttle fleet.

But I can't bet that that program will be approved.

Senator GLENN. I understand that they have put out a budgetary request on that which forced us over into this other consideration, and it appears to be a very expensive alternative to me.

Maybe that is the way we have to go. Maybe it is something we ought to look into.

I have just one other question.

I don't think any of this really gets into SDI, does it?

Mr. ALDRIDGE. No sir. It does not.

Senator GLENN. Is that the motivation behind this, so that we are developing a capability for SDI that we will just keep very quiet and not mention any development plans for SDI?

Mr. ALDRIDGE. No, sir. None of those missions, other than a few of the Shuttle missions and a couple of the experiments, addressed SDI.

Senator GLENN. I know they did not. But is part of the reason for going the multiple launch capability so that we have a capability for SDI? If so, we ought to say so, because this is a part of our deployment expense that we are against over here on SDI.

Mr. ALDRIDGE. I have tried not to raise this issue as associated with the hot political issue of SDI.

Now, ALS certainly is. SDI—if they began the deployment of SDI—would need a heavier lift capacity, which would be associated with ALS. That is where the debate is, on whether or not we can use an interim ALS for SDI purposes.

There is a restriction against spending the money or having an interim ALS to support SDI.

This has nothing to do with SDI, other than the fact that we do provide some launch vehicle capacity for some experimentation, and that is it. The decisions beyond that point will be associated with ALS or associated with the Shuttle because many of the experiments that General Abrahamson would like to perform are man-required systems and cannot be accomplished on expendables.

Senator GLENN. You are aware of some of our hesitation about that.

Mr. ALDRIDGE. Yes, sir. I am very aware of that, very sensitive to it.

Senator GLENN. This committee has dealt with that, and I think when we start getting over into deployment, before we make our breakthroughs in laser and particle beams and computers, we are really on thin ice, and if this is feeding into that and building that capability, whether we want it or not, then I think we have to look at it very carefully.

Mr. ALDRIDGE. It does not, sir.

Senator GLENN. My time is up.

Thank you.

Senator EXON. Thank you, Senator Glenn.

Senator Quayle.

Senator QUAYLE. Thank you, Mr. Chairman.

Let me just go back to make sure that I understand precisely what the reprogramming from the $316 million will get us, or perhaps, more specifically, what it will not get us.

If you don't get this, what will you be giving up?

Mr. ALDRIDGE. I have only one choice. I have to slip satellites or decide not to launch. That is the only option that we have.

The Shuttle capacity is saturated with all the flights that I can get on the Shuttle in that timeframe, and, without those additional funds and that which carries on into the out-years, then the only solution I have is to take those satellites, the operational satellites or the new capabilities that we have talked about, and delay their launch.

Senator QUAYLE. How long are you talking about?

Mr. ALDRIDGE. Well, if I don't get any of it, then I essentially have 25 satellites that I have to push out beyond the 1995 timeframe.

Senator QUAYLE. And if they get this reprogramming, when will they be able to launch?

Mr. ALDRIDGE. There are two different issues. One is the $112 million reprogramming, which deals with a couple of near-term problems. One was the Congress cut about $40 million of the Titan IV program. We need to get that restored and get the first Titan IV fully funded. The other costs were associated with the Centaur. The NASA cancellation of the Centaur program added increased costs to the DOD Titan Centaur program. That, if I did not get the reprogramming, would delay the launch of the Titan Centaur capability.

The other issue was when we investigated the Titan III failure, we found some problems in quality control. The failure, literally was the result of a going out of business problem from the decision to go with Shuttle only. But we now have to take a nondestructive testing (NDT) approach and complete the Titan III program, and also apply NDT to the Titan IV, because we have to test the solid rocket motors for those as well.

If I do not get those funds, then I cannot do the testing, so I would have to delay when I launch.

Now, if you say that I can't have any of it, then I am saying you are probably talking about a year's slip in some of those Titan III payloads.

Now, this is on top of sitting here for 1½ years since we last launched.

Senator QUAYLE. When are the next launches scheduled?

Mr. ALDRIDGE. There are two launches on the ELV scheduled. I had hoped to get one of them off [deleted]. Those are still classified dates.

The Shuttle launch is not scheduled until June next year, and that is a NASA assumption.

Senator QUAYLE. Is that still the schedule for the Shuttle launch, next June?

Mr. ALDRIDGE. Yes, sir.

Senator QUAYLE. Would you again say on the one chart that you put up, there you showed the cost growth in the program. What were the reasons for those costs going up so dramatically?

Mr. ALDRIDGE. The next to the last chart that I had up?

Senator QUAYLE. Yes. I think there was around $5 billion, and then another $5 billion.

Mr. ALDRIDGE. Last year, when we came to Congress, we got an urgent supplemental approved, and we had incorporated the funds because of the *Challenger* accident. Funds were approved last year to start the recovery program, and that was the out-year implications of last year.

That made the assumption that we would be down on the Shuttle for only 18 months.

When the budget was submitted in January 1987 to the Congress for fiscal years 1988 and 1989 budget, we made the assumption that we would be down for only 18 months on the Shuttle.

Now, what has happened since that time is the next line, which was the result of the Shuttle slipping to 30 months, and the launch rate after the 30 months downtime being less than what we had predicted it would be assuming only the 18-month standdown.

So, what happens is all of those satellites that were waiting to fly in that 12-month period, and then the satellites we were planning to fly on the Shuttle beyond that period, we had to take off the Shuttle and put them on expendables.

Senator QUAYLE. So, basically, it is attributed to the extra delay in getting the Shuttle?

Mr. ALDRIDGE. The extra delay and the reduced rate, and to one other event, which was the NASA canceling the Centaur on the Shuttle. This means that we had to pull additional satellites off the Shuttle that needed the Centaur to be launched to geosynchronous orbit.

Senator QUAYLE. Let me ask a question on all of the launch vehicles. You have basically what—Titan II, III, IV, Titan 34D, Delta II, Centaur? Can we consolidate and maybe get a few of those launch vehicles, or maybe more of them, or do we have to have all of these?

It seems to me we have a lot of different ones in the pipeline there, and I am not sure, purely from an efficiency point of view, if you might not want to pick and choose, pick a couple and produce a few more, rather than having all of them.

I was just struck by how many different ones we have.

Mr. ALDRIDGE. That is a good question. Unfortunately, they all have different payload capacities, and they all go to different orbits and altitudes.

Let me go back to something.

The Titan IV, the only reason we have Titan IV is because we made a decision that we are going to take all the satellites off expendables and put them on the Shuttle.

What happened is all the satellites got very flat and round, because you pay by the linear foot in the Shuttle bay.

The design of all satellites was changed, to be 15 feet in diameter and very flat. So, when we made the decision to go with a Titan to launch those satellites instead of the Shuttle, unfortunately the Titan IV had to have a big diameter on the front end, to basically launch the same satellites that the Shuttle could launch.

The Titan IV payload size is 15 by 60 feet, which is the same as the Shuttle bay. Unfortunately, we had to have more than Titan III performance. That was called Titan IV. It is a seven segment solid and a few other things.

The Titan 34D is the one we are flying now, but that is going out of the inventory. So that one (Titan 34D) is, in fact, going away, unless Martin Marietta wants to commercialize it, and that is another decision.

Senator QUAYLE. That is their decision?

Mr. ALDRIDGE. That is their decision.

So, Titan 34s are going away. We have six more of them left. We will fly those out and they will disappear.

Titan III is gone. That has been long gone.

Titan II was an ICBM that we took out of the silo. We figured it was cost effective for us to use that one to launch very selective payloads into polar orbit from Vandenberg—about 2,000 pounds. We can do so very economically. It is an asset which is basically free to us, other than the modification costs. [Deleted.]

Basically, those are the only ones that we had. We had some old Atlases, wheat field Atlases which are going to fly out as well.

Those are going away.

Senator QUAYLE. You don't have those production lines running any more?

Mr. ALDRIDGE. No.

Senator QUAYLE. Which production lines are you going to have?

Mr. ALDRIDGE. We will have Titan IV, Delta II, and then we will compete for the DSCS satellite, which is a booster that is in between those two.

Senator QUAYLE. You cannot put them on one of those?

Mr. ALDRIDGE. No, sir. Well, you could put DSCS on the Titan IV, but the Delta II is not big enough, and the Titan IV is far too expensive to do so.

And so, we are going to compete for an intermediate booster, but we will do so with one that does not require any R&D cost. So we will put it on an ELV in between Delta and Titan IV and basically get a launch which is cheaper than Shuttle.

There's another reason you do not want to do that. We got into that same argument with the Shuttle. Shuttle was the exclusive way to get to space, and we made a tragic mistake by doing that. And we got ourselves into deep trouble.

If the *Challenger* had waited until today to fail and we had not approved the ELV, we would be down 4 years before we could launch another satellite.

We do not want to get into a situation of putting all of our eggs into one basket again. We want multiple launch capabilities. We want to be able to have the flexibility to get to space. Even if we do have a failure, such as we did on the Titan 34, we still had Atlases and we still had the Atlas Centaur, we still had some Scout vehicles and things like that which we could launch with. So we could continue to get to space, but not with a bigger payload.

Senator QUAYLE. Thank you, Mr. Chairman.

Senator EXON. Mr. Secretary, let me try to get to the dollars and cents, to the arithmetic of all of this.

Let us start at the macro level.

The Air Force is looking, as I understand it, at having to make reductions of some hundred billion dollars over the next 5 years. If we in Congress can get the defense budget up to—and I emphasize again, if—if we can get the defense budget up to a level of zero real growth, we still have a problem. In that same 5-year period the Air Force faces major outlays on all of the following strategic systems: the ATB, the advanced cruise missile, the Midgetman, the rail-garrison MX, the SRAM II and the antisatellite weapon.

If cuts on the order of $100 billion have to be made, which I guess you would agree would have to occur if we are to get back to zero, and we intend to protect the conventional capability, which many of us are very determined to do, what are your priorities as Secretary of the Air Force?

Where do all of the extra costs of abandoning the Shuttle in favor of the ELV rank on the list of programs that I just gave you?

I am trying to focus on where the give and take is likely to come from. Have you established your priority with the systems that I have just outlined, in line with the new presentations you are making today?

Mr. ALDRIDGE. I have, but I am not sure that I am willing to share them with you, Senator. You may take some of them.

Senator EXON. Why not?

Mr. ALDRIDGE. Well, let me just say this first. You made an assertion which I guess I wince at a little bit, and that is that we have abandoned the Shuttle.

I would turn that around. I think the Shuttle has abandoned us. Unfortunately, it is not something that we would all like to—as Senator Glenn knows, I feel personally involved with the Shuttle. I had planned to fly it out of Vandenberg last July, July 1986, and I would very much like to see it continue to go.

Unfortunately, the performance of the Shuttle has dropped as a result of the accident, as a result of the fixes, and the safety factors, all kinds of reasons, to the point where many of the payloads that we had planned to fly on the Shuttle we cannot fly anymore. That is not criticism. That is just a fact.

So we have not abandoned it. It has kind of gone away.

Senator EXON. Okay. Let's assume that that is a fact. Can you tell me where the money is going to come from and what is your list of priorities?

Mr. ALDRIDGE. Well, I can tell you the list of priorities. But I sure cannot tell you where the money is going to come from because we are just going through this exercise right now.

My priorities are that I would do nothing to affect our people in our Air Force. If there is one super quality thing we get and the most return on our investment, that is the quality of the people that we have.

I happened to observe an exercise down in Langley, where I saw our people turn out in 30 days of an exercise a fantastic performance using their equipment, much better than any computer model would ever predict. It was because of the innovation and quality of the people that we have that we are able to do that.

It was worth hundreds of millions of dollars to us in investment in parts because of the innovation of the individuals and the quality and experience they had. We need to keep working on that, so people will always be my number one priority. I would not cut any people programs under any conditions, and I made that comment many times.

Senator EXON. Well, we agree. Then where do we cut?

Mr. ALDRIDGE. I think you have to go back and take a look at the strategic priorities. I think you have to look at the ICBM program, can we afford two ICBM programs?

I would argue that I think most of the Air Force programs are high leverage and high capability, so it is not just Air Force that you have to look at. You have to look across the defense programs at which is giving us the most—Air Force, Army, Navy, Marine Corps.

I would not cut our tactical programs as much. I would take a hard look at strategic.

Senator EXON. I think it is fair to say that I am going to try to press you down to some decisions here. I am trying to get some guidance for the committee without a real commitment from you.

Of those lists of strategic systems, I suspect the first one that you would say would be of a lower priority would be the Midgetman, is that fair?

Mr. ALDRIDGE. That is a true statement, of lower priority, at lower budget.

Senator EXON. Now that I have suggested one and you have confirmed it, what other lower priority programs do you see?

Mr. ALDRIDGE. I cannot think of a single one, Senator.

Senator EXON. I was afraid of that.

Well, then, let us go to an even more difficult problem, even getting back to zero growth. If the President decides not to cooperate in finding a revenue enhancement necessary to meet the Gramm-Rudman-Hollings schedule and we have an accross the board sequester, what effect would this have on the Air Force space launch plans, including the plans that you have just presented to us?

Does it delay the availability of satellites, as well as launch vehicles? Since your first few Shuttle flights are already paid for, they would not come under the sequester, and since they are free from the sequester, does this not make them even more of an attractive capability?

Should you be holding on to all of them for dear life, or, putting it another way, I suspect that the bottom line in all of this, Mr. Secretary, is that in our effort to do all of these things, including a manned space station, the Shuttle program, when it gets back on track again, is going to be converted or diverted essentially to car-

rying payloads for that. Is that a fair assumption? If therefore, it cannot take care of the things which you would like to have it do.

You said earlier that the Shuttle had abandoned you. Is the reason the Shuttle has abandoned you that they are putting a higher priority on the manned space station?

Mr. ALDRIDGE. Well, sir, I cannot say which is the priority. I know that NASA's view is that the Shuttle is a program which is basically completed, and now they need to get on with a new program, and that is called space station. The Shuttle is going to be necessary for the space station. I think the problem is going to be that they not only need the Shuttle, but they are going to need some additional capability to fully support a space station mission model for both the launching and the refurbishment of it.

I think they are going to need some type of heavier lift vehicle to support the space station, in addition to that which is going to happen with the Shuttle. I think that is one of the priorities they put on Shuttle C. They really see the need for a capability that is even beyond what they currently see for the Shuttle.

At one time they were planning on Shuttle flight rates of 24 flights a year, and that is what the assumption was, that we were going to build up to 24 flights a year. Right now, the assumption is 14 flights a year.

Senator EXON. And those 14 flights a year are basically back to the manned space station.

Let me ask you this question.

Mr. ALDRIDGE. No, sir.

Senator EXON. If it were decided that we were going to set back in our manned space station for 3, 4, 5, 6, 20 years, whatever it is, could we use that life capability to carry out your missions, as opposed to the expensive new program that you have outlined?

Mr. ALDRIDGE. No, sir, we could not.

Senator EXON. You could not.

Mr. ALDRIDGE. You could not in the timeframe we are talking about here, through the 1994–1995 timeframe.

The Shuttle mission model, as closely as we can predict, is full without the space station. We have taken all the capacity of the Shuttle, for missions that have already been identified, and have used it up, and now what we need is to launch those satellites above and beyond the Shuttle mission model that are currently planned.

That assumes that we push this thing out.

Senator, let me just say that from the point of view of prudent planning, I have to make an assumption that the Shuttle is not going to fly in June 1988, that it is going to slip beyond that point.

What I have done with this recovery program is try to make a program that is not sensitive—at least is not as sensitive as it could be, to the precise time when Shuttle is going to fly again. There are going to be all kinds of uncertainties, as Senator Glenn knows. There are safety commissions and others that will be looking over NASA's shoulder when they fly. When it flies again, it is going to have to be the most perfect mission that the Shuttle has ever flown.

So I am not going to make the assumption that it is going to fly in June, July, or August. What I have tried to do is to make a pro-

gram that makes sure I can meet the operational needs of putting those essential satellites into orbit when they are needed, without having to be dependent on the sensitivity of whether it is going to be a June or July or August or October date.

Also, I have tried to hedge against the possibility of the uncertainty of the flight rate. What if it is only 12 a year?

I have tried to remove as much of the uncertainty of the defense planning from the uncertainty of the Shuttle as I can. What I have given you is a robust program that is not sensitive to that, that can still use the Shuttle for those unique missions that it can perform, and also give us a very strong, robust launch capability that did not exist before the *Challenger* accident. We are paying the price for it.

I do not want to pay that price again.

Senator EXON. Mr. Secretary, my time is up. But what I am hearing from you is, at least this is my interpretation, although I am sure you do not want to say it, is that you are not relying on the space Shuttle to have any key role as far as the national defense of the United States is concerned, as far as the Air Force is concerned.

Mr. ALDRIDGE. For those operational missions that do not require a man in the loop; except for those payloads that have already been integrated in the Shuttle that are too expensive to now take off.

Senator EXON. I understand. After that, you will kiss it off.

Mr. ALDRIDGE. Yes, sir.

Senator WILSON. Mr. Chairman, please excuse me. I don't mind waiting, except that I have to leave again, and I want to try to cover a little ground.

Senator EXON. Senator Wilson, I'm sorry. I did not see you come in. Please proceed.

Senator WILSON. Mr. Secretary, am I correct in understanding that fiscal year 1987 reprogramming does not involve new requirements, that you are simply carrying through on last year's programs?

Mr. ALDRIDGE. Yes, sir. That is correct—with the exception that one thing is not new. Part of those funds of $112 million includes the impact upon us of the NASA cancellation of the Centaur, the additional cost we now have to pick up in order to keep the Centaur on schedule for launching our DOD satellites. That is something that perhaps was not a part of the 1987 budget submission. But it is, in fact, carrying forth last year's program.

Senator WILSON. In a similar vein, your fiscal year 1988 requirement I take it does not involve any new policy ground; rather it is a reflection of additional requirements based on the new Shuttle delay.

Mr. ALDRIDGE. Yes, sir, that is correct.

Senator WILSON. Let me ask you this question.

This is one thing that is really hard to comprehend.

Given the Gramm-Rudman situation, does it seem likely that you are going to be faced with the problem of spending more than your request? If you are going to do all of this through reprogramming and initially your requirement was $5 billion, now I understand your program will be $11 billion, and you are going to try to fund

this all through reprogramming, what are you going to take it from?

Mr. ALDRIDGE. Well, sir, the reprogramming part will take care of the out-years, 1990 and beyond, and our program objective review, when we get it in the Pentagon next summer, when we go through our process for fiscal year 1990—we'll have to reallocate our priorities within our budget allocation within the Pentagon.

What we have to do in 1988 and 1989, because that is the budget that you already have over here, we will have to come in and show you how we could fund it within the resources that we have.

Senator WILSON. Do you have any suggestions as to where you might look?

Mr. ALDRIDGE. Right now, we are working to try to find the sources for it.

Senator WILSON. Neither the chairman of this committee nor I, nor I suspect, Senator Quayle, will be uniquely offended if you found some money in the small mobile missile program.

Senator EXON. Oh, we have gone through all of that.

Mr. ALDRIDGE. Yes, sir, when you were not here a minute ago.

Senator EXON. And he agreed with that?

Senator QUAYLE. And quickly so.

Senator EXON. But he would not go any further.

Senator WILSON. Then that is all I have. Thank you very much, Mr. Chairman.

Senator EXON. Thank you.

Senator Quayle.

Senator QUAYLE. Thank you, Mr. Chairman.

I wonder if you would be able to walk through your priority bases for us, looking at these things over the next 15 years, 10 or 15 years, the launch recovery program, the space station, national space plane and the heavy lift vehicle program—how do they all fit in and what kind of importance do you attach to each one of these?

Can you give us a feel for what we ought to be paying attention to from your viewpoint?

Mr. ALDRIDGE. Yes, sir.

It does not make any sense at all to go and build something new until we launch what we have. We have to pay this bill. I don't care what the level of Air Force funding is, we have to pay this bill.

Senator QUAYLE. When you say "pay this bill," you are talking about what?

Mr. ALDRIDGE. This is the launch recovery bill.

Senator QUAYLE. The launch recovery program you see as absolutely imperative, and we have to do that now, in the short term and in the long run?

Mr. ALDRIDGE. I cannot overemphasize the importance of launching those satellites that we have identified here.

We did not go into a lot of the detail, but we could. In terms of the specifics of the classified satellites, I cannot overemphasize the importance of those satellites being launched now, on time, because we have been down—without a launch capability—for so long that they—our existing on-orbit satellites—are starting to wear out.

I cannot come to you, Senator, when we say that we are going to reach an arms control agreement on START and say well, we can

do that and not pay this bill, because I cannot make such incompatible statements. I have to launch those satellites for you to have an assessment of whether or not you can verify a START agreement. Those satellites are essential. All of them are. They are early warning satellites, command and control satellites, they are new capabilities for Milstar, for survivability of our command and control system, [deleted] all of which are not new missions in the sense that I have the discretion to wait and launch them next year because I can wait for the information to come back.

These are operational systems, currently designed or identifed, that are waiting to fly, to meet an operational need.

I have no choice other than to slip them if I don't pay for these launch recovery actions. I would put this as probably near the top priority in the Air Force for funding, no matter what the level of budget would be. That is where I would put it.

Now, when you go into things like the space station, that is a hard one for me, sitting in the Air Force, to argue because that is a NASA program.

We, in the Air Force, have not identified a need for a military man in space. We can meet our operational needs with unmanned systems. So, we have not said hey, we are going to pay for a space station for military purposes. We have not found the need to put up any money to do so, although we say that we should not preclude the option to do so sometime in the future, if we can find that pearl that says maybe a military man in space does make some sense.

But, right now, we are not willing to pay any money for it. So it is at the bottom of our priority list.

Heavy lifters I think are something we ought to pay some attention to because we are still paying too high a price to get to orbit. The cost of these existing systems is exhorbitant. Really, $250 million to launch a Shuttle—that is the cost to the taxpayer—is ridiculous, and with that we have not put a dollar into the satellite yet. It is getting to the point where the launcher is more expensive than the satellite, and that is the wrong direction.

We should be heading for a lesser cost to orbit. That is what the advance launch system concept is all about—let's get lower cost to orbit. Let's get it down by a factor of 10, if we can. If we can get it to a factor of three, I would be elated, or a factor of two. But the idea is let's work to get a lower cost to orbit as the number one priority.

Senator QUAYLE. That means getting on with the advanced launch system, then?

Mr. ALDRIDGE. That's right. That is an R&D program. But it does not anywhere compete with the getting on with the launch systems that we already have. It is a lower priority than the recovery. But it is still there. It is something we ought to be doing, but it is at a lesser priority.

By the way, if you are going to cut the cost to orbit, why don't we get a booster that can lift heavier payloads, such as for the space station or SDI or combinations of those things. That is a secondary part of ALS. But we need to get on with that.

So I would put launch recovery way at the top, ALS somewhere in between, space station down here (indicating) somewhere below. I think those are the three that you talked about.

Senator QUAYLE. What about the fourth and fifth Shuttle, the whole Shuttle program?

Mr. ALDRIDGE. Well, NASA has the fourth orbiter under contract.

Let me tell you that my priority would be somewhat different there.

I think we need a replacement orbiter, if we ever expect to get the 14 flights a year. We know, in the airplane business, if you are going to have three operational airplanes, you don't buy three airplanes. You have to have another one, a fourth one.

We know we are going to be down again with the orbiter. There is going to be a time when the main engine has to be repaired, when we have to go through an overhaul. So if we want three operational orbiters, we need a fourth one.

However, I would improve the performance of the orbiters that we have to bring them back up to the performance that was previously specified before I would buy a new one.

It is more important to get that performance up than it is to buy a new orbiter.

But the fourth orbiter is going to have to be based on the national need, not the need of the Department of Defense.

It is going to have to be looked at from the view of NASA, DOD, all the foreign users, or whatever, and put it together for a full mission model. I think you could justify a fourth orbiter from that. But, again, I would never pay for a fourth orbiter in lieu of paying for the launch recovery.

Senator QUAYLE. In your judgment, is there a connection between, say, the fourth and fifth Shuttle and also the space station? If you are going to delay putting off the space station until after 1995 or even beyond that time, is there a connection between going ahead with that fourth Shuttle and even the fifth Shuttle if you are going to put off the space station?

Are the two somewhat tied together?

Mr. ALDRIDGE. On the fourth orbiter, I could argue that there is a kind of national need, kind of independent of the space station, but on the fifth orbiter, I don't know.

Senator QUAYLE. It is connected with the space station, isn't it?

Mr. ALDRIDGE. But I would not build a fifth orbiter to support the space station. I would build a heavy lifter, an ALS, to get the cost to support the space station down.

Senator QUAYLE. You know, I congratulate the chairman for having this hearing.

I think getting into this whole space station more than we have is a good idea. Just going through this discussion here and the prioritization of what we ought to be focusing on is useful.

The Secretary has given us his ideas, and we will also have to listen to other people, too.

Mr. ALDRIDGE. Others may have somewhat different ideas.

Senator QUAYLE. I can tell you, looking at some of these figures, that we are talking about some big, big bucks.

We are going to have to sort out our space strategy, particularly our launch capability, as to what we are going to do. Now is certainly the time.

I think the chairman is right on to begin to get this committee involved in this. I can tell you that there are going to be some big decisions coming down the road and how we merge with NASA, which is in an entirely different committee's jurisdiction.

Mr. ALDRIDGE. Senator, I applaud you on that, too.

Senator QUAYLE. All of a sudden we see that we really have not focused on it, and I think you are starting to get us into it.

But once you get into this subject, just from a cursory, introductory interview this afternoon, you see how it is a preview of what we have to do. Then, just listening to some of these really big ticket items that we are talking about really makes you wonder.

Mr. ALDRIDGE. It is an important factor.

Let me point out that I, too, applaud the chairman for this because I have had to deal with a lot of committees, mostly with those that focus only on the NASA budget, though, and sometimes we get beat up over there a lot. You know, here is this great, big DOD and this little bitty NASA sitting over here and we kind of get beat up on our space station for not having supported the NASA Program. In fact, I think we need someone who oversees the Department of Defense, in our committees, on the Armed Services Committees overseeing space as well, not only just the NASA committees.

I think it is a good idea to balance those two together because it is not true that we in the Department of Defense are overshadowing NASA. When you take out the operational things that we do and compare apples to apples to what NASA does, in fact NASA spends more research and development money than the Department of Defense on a comparable basis.

It is a good idea. I think Senator Warner also wrote you a letter about doing something about this earlier, too. I think that is all just great.

Senator EXON. Let me ask another question that maybe makes the situation even worse.

You are talking about the ALS program. If I understand your figure correctly, Mr. Secretary, the R&D on the ALS program, which seems vital to me, is going to require another $8 billion additional over and above the $5.9 billion or $6 billion that you have outlined for up to 1994, isn't that correct?

Mr. ALDRIDGE. Senator, it is probably big dollars. I cannot tell you what the total dollars will be because I don't know what the concept is yet.

We have seven contractors under contract to go and develop the concept for an advanced launch system, and all of them are in a kind of competition, working the conceptual approach to what it will be and how they can get there and what ideas they have.

So, it will be several billion dollars, yes, but the precise number I cannot identify because I don't know what the concept might be.

Senator EXON. I don't know what it will be either, but it will be several billion dollars over and above the $5.9 billion that we talked about today.

I would simply say, Mr. Secretary—and this is not said in the form of criticism—that this is a vindication for what I wrote in a letter about 1 year ago to Secretary Weinberger, when I told him that I was extremely fearful about the not-yet-seen price tags for what I knew was coming down the pike, including most of the things that you have announced here today. My concern excluded the new $5.9 billion. I did not know about that, but I knew about all of the other programs.

I wrote a letter to the Secretary and said that, with the budget crunch that obviously is coming upon us, with the Gramm-Rudman mess—that it is going to decimate national defense. It is going to decimate this program, and it looks to me like there is a new fear today that the sequester is going to take place.

If the sequester takes place, where are we going to be?

It gets back to what I wrote the Secretary of Defense about 1 year ago. He came over to see me to say that he did not understand. I told him that it was my view that the next President of the United States would inherit a national defense program that was planned to go bankrupt from the standpoint of the money that would be provided. When I asked you some of the questions that I asked you today—and I must say, Mr. Secretary, that you answered them as best you could, as a good soldier—I think you were honest. If you were sitting on this side of the table, especially for someone who is going to be here until, Lord willing, 1990—and I don't know whether or not you are going to be around that long—there will be some of us still wrestling with this program even after you go back to making money in the free enterprise system once again.

Mr. ALDRIDGE. Oh, I hope that is the case.

Senator EXON. I'm afraid that it is kind of a dismal fate that is facing us.

Now, I do intend to hold some more hearings on this subject. You have been very forthcoming, and just to show you how forthcoming we are over here, I want to say that we are going to let you out early. I think that may be the first time that ever has happened in the history of this committee.

Mr. ALDRIDGE. Thank you, sir.

Senator EXON. We are going to let you go early because you have been very much to the point and your presentation was a good one.

There will be some other questions that we will ask you to answer for the record. I understand that Senator Thurmond was not able to make it because he is tied up on another somewhat controversial subject over in the Judiciary Committee. So we will allow his statement to come into the record.

[The prepared statement of Senator Thurmond follows:]

PREPARED STATEMENT OF SENATOR STROM THURMOND

Thank you, Mr. Chairman. I want to congratulate you for recognizing the urgency of the subject matter of this hearing, and scheduling the hearing in such a timely fashion. This is a tribute to your continued strong leadership of the subcommittee, and an indication of how important assured access to space is to our overall military posture.

Mr. Chairman, I join with you in welcoming Secretary Aldridge back to the committee. His presence here today, shortly after his return from an extended overseas trip, speaks loudly of his continuing strong commitment to assured access to space.

Secretary Aldridge, I congratulate you, not only for your leadership in the space arena, but also for your outstanding leadership as Secretary of the Air Force. Keep up the good work! I look forward to hearing your testimony.

Today's hearing will afford an opportunity to address several issues that have come to the attention of the committee in recent months.

The first, and most urgent of these, is the need to reprogram fiscal year 1987 funds to meet shortfalls in the space launch recovery efforts that were initiated last year. I do not believe that the proposed funding transfers constitute any change in the policies that this committee strongly endorsed last year in supporting the space launch recovery effort. Mr. Chairman, I am hopeful that information presented in this hearing, both in prepared testimony and in the answers to questions, will provide a sufficient basis for the committee to act quickly in approving the reprogramming that is now before the committee.

Mr. Chairman, during our markup of the fiscal year 1988 budget request, staff advised the committee of a significant funding shortfall in the fiscal year 1988 and fiscal year 1989 budget request for space launch support. In the interim, the details of that shortfall have become known, and today's hearing will give us the opportunity to review these requirements. I am hopeful that today's hearing will give us enough information to act on the fiscal year 1988 requirements, either during the course of the upcoming markup, or in cooperation with the appropriations committee in the formulation of an appropriation bill or Continuing Resolution.

Mr. Chairman, I am as interested as you in the implications of the near term space launch recovery efforts to a long term plan that will include expendable launch vehicles, the Shuttle, and the advanced launch system. I look forward to today's hearing as the opening round of a dialogue with the Air Force on these important issues.

Senator EXON. I want to thank you once again for your forthrightness, and please tell us honestly where you see things coming from. At least that gives us the proper information, hopefully, to make the correct decisions.

With that, we thank you.

Mr. ALDRIDGE. Mr. Chairman, I appreciate your remarks, and I thank you, too.

I would just say one thing. I would like to request that the reprogramming that we do have over here for fiscal year 1987—I really need that money as quickly as possible. That does not affect this out-year increase, but it does affect my ability to get the vehicles we currently have on the ground off as quickly as possible.

Senator EXON. That is how much again?

Mr. ALDRIDGE. That is $112 million, in 1987.

Senator EXON. That's $112 million in 1987. Well, we will see what we can do to expedite that. I know that was your main purpose for coming over here.

Thank you for your presentation.

This subcommittee is adjourned.

[Questions for the hearing record with answers supplied, follow:]

QUESTIONS SUBMITTED BY SENATOR J. JAMES EXON

Senator EXON. Mr. Secretary, if the President decides not to cooperate in finding the revenue enhancements necessary to meet the Gramm-Rudman-Hollings ceilings, and we have an across-the-board sequester, what effect does this have on Air Force space launch plans, including the plan before us?

Does it delay the availability of satellites as well as launch vehicles? Since your first few Shuttle flights are already paid for, and thus free of sequester, doesn't this make them an even more attractive capability?

Should you be holding on to all of them for dear life, or, putting it another way, I suspect that the bottom line in all of this, Mr. Secretary, is that in our effort to do all of these things, including a manned space station, the Shuttle program, when it gets back on track again, is going to be converted or diverted essentially to carrying payloads for that. Is that a fair assumption—and therefore it cannot take care of the things which you would like to have it do.

You said earlier that the Shuttle had abandoned you. Is the reason the Shuttle has abandoned you that they are putting a higher priority on the manned space station?

Mr. ALDRIDGE. Well, sir, I cannot say which is the priority. I know that NASA's view is that the Shuttle is a program which is basically completed, and now they need to get on with a new program, and that is called space station. I think the problem is going to be that they—the space station program—not only need the Shuttle, but they will also need some additional launch capability to fully support a space station mission model—for both launching and the refurbishing the space station.

I think they are going to need some type of heavier lift vehicle, in addition to the Shuttle to support the space station. I think that is one of the priorities they put on Shuttle C. They really see the need for a launch capability that is even beyond what they currently have in the Shuttle.

At one time they were planning on Shuttle flight rates of 24 flights a year, and that is what the assumption was—that we were going to build up to 24 flights a year. Right now, the assumption is 14 flights a year. The space station launch requirements will certainly be a heavy load on Shuttle capacity.

Senator EXON. Mr. Secretary, when the need for additional funds for space boosters in fiscal year 1988 and fiscal year 1989 was communicated to our committee last May, we were told that the bill would be about $800 million in fiscal year 1988 and about $1.2 billion in fiscal year 1989 for a total of about $2 billion. What happened to the other billion dollars? Is that the "second shoe," after we have dealt with the first billion dollars?

Mr. ALDRIDGE. When we were told of the additional slips in the Shuttle program, we began to lay out the alternative plan I've described today. As we fleshed the plan out and got the first cost estimates, we briefed your staff with information as current as we could make it. All along we have tried to minimize the fiscal year 1988 and fiscal year 1989 impacts. To do this we have continued to scrub our numbers and requirements. I've shown you the extent of the recovery program as we see it through 1995. That explains how the fiscal year 1988/89 numbers evolved over the last months along with our estimate of the program through the outyears.

Senator EXON. Mr. Secretary, in your statement you give high marks to the Advanced Launch System (ALS). Yet your plans through fiscal year 1995 assume no use of an ALS. Your RFP for the ALS still asks for "interim capabilities" in the early 1990s, and NASA is also studying a "Shuttle C" heavy lift vehicle to use by 1993. If either of these comes to pass in the early 1990s, isn't that going to provide another alternative, especially to Titan IVs?

Mr. ALDRIDGE. The ALS RFP requests that the contractors not preclude an interim capability. This was included so that we would be able to respond if an early decision were required on a heavy lift vehicle for an SDI system. We have no plan to build an interim capability unless that decision is made, but we do need to continue the technology development efforts necessary to improve our existing launch system where possible and prepare for the implementation of the next generation of launch vehicles to meet all space launch needs.

Senator EXON. Mr. Secretary, one of the stated goals of the Administration after the Challenger and Titan disasters was to ensure that we never again be dependent on a single launch vehicle for any payload. I would like you to tell us how close this new plan comes to that ideal situation.

For each of the satellite payload types on your list through 1995, would you please identify the primary launch system, and all other launch vehicles that could be used to put that satellite payload into orbit if the primary launch system were unavailable?

For each of those secondary launchers, what is the lead time to switch to a secondary launch vehicle, what changes would we have to make in the satellite payload to use a secondary launch system, and how much would those changes cost?

Mr. ALDRIDGE. We plan to launch [deleted] on Titan IV. Milstar, BSTS [deleted] can only fly on Titan IV because of performance shortfalls on Shuttle and the cancellation of the Shuttle Centaur upper stage. The GPS spacecraft can be launched on Delta II (primarily) or Shuttle. DSCS was prime on Shuttle but due to lower availability, we must procure the MLV II as the prime vehicle for that spacecraft. We could still use Shuttle if necessary. The DMSP meteorological satellite will be launched on Titan II vehicles only, once the converted Atlas booster capability is terminated in 1990.

Senator EXON. Mr. Secretary, according to an article in Sunday's Los Angeles Times, the Soviet Union's big new "Energia" space launch vehicle is designed to be

completely reusable. If true, how many years is the Soviet space launch program ahead of our own in terms of reusability and reduced launch costs?

Why are we so far behind the Soviets and is there anything that can be done to narrow the gap?

Mr. ALDRIDGE. Senator, according to my information, the "Energia" is not a completely reusable booster. [Deleted.] The "Energia" with their other boosters gives the Soviets a tremendously versatile fleet with the capacity to launch space systems far larger and in excess of any requirements we currently understand. The Soviets have always insured that their launch vehicles and infrastructure provided a little more capacity than needed to meet requirements.

[Deleted.] The question should certainly be asked—why do they need that much launch capacity?

QUESTIONS SUBMITTED BY SENATOR JOHN C. STENNIS

Senator STENNIS. Identify all tooling and facilities costs negotiated or budgeted for the Titan IV program (Vehicle No. 1-50) and for the Medium Launch Vehicle program (fiscal year 1987-95).

Mr. ALDRIDGE. The tooling and facility costs for the Titan IV program, which has been reduced in scope from 50 to 48 vehicles are:

Tooling (Vehicles 1-23): $98.6 million;
Facilities (LC-41): $56.9 million;
Facilities (SLC-4E): $161.6 million;
Tooling (Vehicles 24-48): $28.0 million;
Facilities (SLC-7): $600.0 million; and
Facilities (LC-40): $135.0 million.

No specific tooling and facility costs were negotiated for the Delta II Medium Launch Vehicle program; however, under the "turn-key" concept, launch site modifications and several new tools for the existing NASA production line are part of the program cost. These tooling and facility costs are:

Tooling: $2.4 million; and
Facilities: $1.2 million.

Senator STENNIS. Has any of the production tooling been paid for in full or in part by the contractor?

Mr. ALDRIDGE. We expect the contractor to capitalize approximately 66 percent of the tooling required in the enhanced Titan IV program (Vehicles 24-48).

Senator STENNIS. What is the negotiated profit margin on the first 23 Titan IV vehicle buy? What is the negotiated profit margin on the 20-vehicle MLV buy?

Mr. ALDRIDGE. The profit margin on the Titan IV program is 10.5 percent. Closely tied to the profit margin, however, is an incentive program that can increase or reduce some or all of the profit pool. Under the terms of the Delta II contract, the profit is 10 percent ($59.25 million) plus an annual award fee of up to $1 million, and an incentive fee of $3 million per successful launch. Negative incentives are also included: loss of all incentives for one failure; loss of all incentives and one-half target profit for two failures; and loss of all incentives, all profit and award fees for a third failure.

Senator STENNIS. The current law requires the contractor to fund at least 50 percent of the cost of production tooling on a contract, unless an exception is granted by the service Secretary. Have any such exceptions been granted for any of the booster programs? Please provide documentation of any exceptions.

Mr. ALDRIDGE. No exceptions have been requested or granted for the contractor to fund less than 50 percent of the cost of production tooling for booster programs since enactment of the law. All booster procurements were solicited prior to the effective date of this law. All future solicitations will be in accordance with this law.

Senator STENNIS. Has the Air Force considered competing the payload fairing for the Titan IV enhanced program?

Mr. ALDRIDGE. Yes, we looked at that as an option but found too many disadvantages in competing payload fairings for the Titan IV booster. The current fairing has been integrated with the booster and the spacecraft. Significant new integration efforts would have to be accomplished at increased costs if a new fairing and fairing source were sought. McDonnell Douglas is the only payload fairing contractor currently capable of building the large diameter payload fairings necessary to meet the launch dates required by the Titan IV users. Other contractors might be able to de-

velop, qualify, and deliver fairings given time and money, but launch dates dictate staying with the current subcontractor.

Senator STENNIS. The committee has been told that the total hardware cost of the 50 vehicle Titan IV program will be approximately $11.1 billion. Is this the current Air Force estimate?

Mr. ALDRIDGE. $11.2 billion is the approximate cost of the required 48 vehicle Titan IV program (fiscal year 1989–95). This includes prior year and outyear funding.

Senator STENNIS. Of the total estimated hardware costs for the 50 Titan IV vehicle program, what is the estimated cost of the solid rocket motors? Are there tooling costs budgeted within this amount? Please identify.

Mr. ALDRIDGE. Solid rocket motor (SRM) hardware costs for the 48 vehicle Titan IV program are dependent upon the subcontractor involved. No production tooling is included in the Chemical Systems Division (CSD) unit hardware prices. The Hercules unit hardware costs include amortization of development costs across 40 solid rocket motor sets. The unit hardware price on a Chemical Systems Division SRM is $38 million per shipset. A Hercules Corporation shipset is an estimated $44 million. The Hercules motor is not yet negotiated. Approximately $30 million has been invested into tooling at CSD for the Titan IV program, and an estimated $115 million will be invested in tooling at Hercules.

Senator STENNIS. Has the Air Force estimated the potential fiscal savings if the solid rocket motors were provided as Government Furnished Equipment (GFE) to the prime contractor? If so, how much could be saved?

Mr. ALDRIDGE. Solid rocket motors as GFE have not been evaluated because Martin Marietta is a prime contractor with Total Systems Performance Responsibility. Presenting these motors as GFE would relieve Martin of this responsibility, increasing Government liability in case of a launch failure. Additionally, an increase in the number of government personnel would be required to manage the solid rocket motor associate contractor effort versus a subcontractor where the prime has the burden of day-to-day contract management.

Senator STENNIS. The funding requirements for the 50 vehicle Titan IV program assume congressional approval of a multiyear contract. If Congress did not approve a multiyear contract, what is the additional cost of the 50 vehicle program?

Mr. ALDRIDGE. Air Force Multiyear Exhibit Validation Packages for a 10 and 23 vehicle Titan IV program have validated savings of 15 percent. In assessing a follow-on procurement of up to 25 vehicles through fiscal year 1993, a multiyear contract would be desirable because of the flexibilities and savings involved. However, [deleted] we will not achieve as large a savings as on the first 23 vehicles. The savings for the follow-on procurement would be more in the range of 5 percent. This translates to an additional saving of approximately $125–135 million for the follow-on 25 vehicles.

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND

AIR FORCE SPACE LAUNCH POLICY AND PLANS

Senator THURMOND. Your testimony suggests that the changes in the recovery plan in fiscal year 1988 and later years are the results of NASA announced changes in Shuttle availability. Could you expand on the impact of NASA decisions on DOD payloads?

Mr. ALDRIDGE. When NASA announced in May that Shuttle launches would not resume until June 1988—a slip from February 1988—they also announced a lower flight rate for the whole fleet in the outyears. The yearly rate was reduced from 16 to 14 flights, but just as significant, NASA does not plan to reach that reduced level until 1994 which is 2 years later than originally planned. That yearly rate, by the way, is contingent on a four orbiter fleet. The result is approximately 17 fewer Shuttle flights available through 1995. As I discussed earlier, Shuttle performance has also been reduced. This change affects the heavier payloads the most, but all Shuttle users are affected. We have to offload more DOD space missions as a result of lower Shuttle availability and performance as well as to avoid unacceptable launch schedule impacts to important DOD and national security missions. We must offload eight payloads to our heaviest lifter, the Titan IV, and four more Global Positioning System (GPS) spacecraft to the Delta II. To alleviate schedule impact to Defense Satellite Communications System (DSCS) spacecraft awaiting launch [deleted] we need a more capable Medium Launch Vehicle (MLV–II) by 1991. With your approval

to execute these necessary plans we should effectively complete the overall recovery from the 1986 accidents and these additional Shuttle program changes by 1992.

Senator THURMOND. Has there been any change in the payload side since we last reviewed the launch recovery plan? Are there any new satellite programs involved here?

Mr. ALDRIDGE. One program, [deleted] was not included in the original plan and is now shown against the Titan IV requirements. [Deleted.] Since NASA cancelled the Shuttle Centaur in 1986, the Titan IV Centaur is the only means for launch of [deleted].

Senator THURMOND. Is it correct to observe that our virtually sole dependence on the Shuttle for assured DOD access to space is being replaced by virtually sole dependence on expendable launch vehicles?

Mr. ALDRIDGE. Senator, it is correct that we have moved from the plan of sole dependence on Shuttle. We began that move with Congress' approval of the Complementary Expendable Launch Vehicle program and the plan to refurbish deactivated Titan II ICBMs for space missions. However, as you can see from this chart in my briefing [deleted] DOD will employ five different launch systems to meet our launch needs. This fleet of vehicles provides a capability that doesn't depend on just one launch vehicle. While we will continue to use the Shuttle, it will be used primarily in support of those DOD missions that require the unique capabilities of Shuttle such as man-in-the-loop operations. The Shuttle will be available if we have any unforeseen problems [deleted]. The most important aspect in our heavier dependence on ELVs is that we won't go totally out of business for 2 years or more because of one launch accident. If we have a failure or problem with Delta II, we don't ground the Titan IVs and the Titan IIs. We can keep delivering spacecraft to orbit with the other launch systems while we fix that problem. In some instances, and if necessary, we will be able to move spacecraft from the grounded launch vehicle to one of the other operational ones. [Deleted.] This flexibility should preclude a recurrence of the impacts we experienced from the failures in 1986.

Senator THURMOND. What is the role of the Advanced Launch System in the overall launch recovery plan?

Mr. ALDRIDGE. The Advanced Launch System is a program that will deal with meeting the Nation's future requirements. The systems we are procuring today—the ones that are necessary to get us through the launch recovery—do not provide any excess capability in the early 1990s. Even later when we have effectively completed the recovery, we run a risk that an accident similar to the ones in 1986 will still have a significant impact in meeting individual program launch requirements. We need to begin planning and transitioning to the next-generation systems that, in the early phase, will provide the capacity and flexibility necessary to reduce failure risk and impacts to our space programs, and in the far term, provide systems with more reliable capability at reduced cost. The ALS program will be the effort to continue technology development and implementation that will lead to this future generation of boosters.

Senator THURMOND. Your testimony says that selected military missions will have "dual compatibility" with ELVs and the Shuttle. Does this mean that these payloads will be interchangeable on these launch vehicles?

Mr. ALDRIDGE. Yes, sir. Satellites [deleted] have been designed to fly on Shuttle or on one of the ELVs. Once a satellite is configured to launch on one system, it usually takes around 6 months or more to reconfigure it to fly on a different launch vehicle. Launch vehicle considerations also affect the time it takes to switch. If the satellite is shifted from an ELV to the Shuttle, it takes a little over 2 years to complete Shuttle mission planning, preparation, processing and launch. Reconfiguring an ELV for a different satellite could take up to 6 months. The important point here is that we have more than one way to launch these spacecraft. If we have a long launch standdown on one system we can reprioritize and move our most important satellites to other available systems.

Senator THURMOND. How soon does action need to be taken on the fiscal year 1988 unfunded requirement? Can this be accomplished through the normal reprogramming process? What would be the impact of Congress failing to act on the fiscal year 1988 requirement?

Mr. ALDRIDGE. We have laid out the requirements very carefully and scrubbed the numbers in order to lower the 1988 and 1989 requirements as much as possible. We need congressional support now on the $316 million for 1988. The 1988 funds we request are needed by January to complete the repour and recertification of the solid rocket motors for the remaining Titan 34Ds, complete development of the Centaur upper stage for Titan IV, implement new reliability and inspection techniques for Titan IV, and increase ELV production and launch capacity to alleviate the reduced

Shuttle availability. We are already working the identification of sources to accommodate a reprogramming of the necessary funds. We need your support for the reprogramming by January to keep the space launch recovery plans on track. Otherwise, delays [deleted] will cause a serious risk [deleted]. Similar impacts will occur in the Titan IV program, and delays in initiating the MLV II program will place the DSCS satellite constellation health solely at risk to any additional delays in the Shuttle program.

Senator THURMOND. Have you considered procuring launch services for DOD payloads, such as GPS and the Defense Satellite Communication System satellites, rather than procuring Medium Launch Vehicles?

Mr. ALDRIDGE. We have considered procuring commercial launch services for Defense payloads. The original Medium Launch Vehicle competition, now the Delta II program, was one step in this direction. For the Delta II, the prime contractor has the responsibility for a totally integrated launch process and the Air Force takes delivery of the hardware following rocket engine ignition and liftoff. With the Medium Launch Vehicle II competition for DSCS launches, we are attempting to take the acquisition strategy one step further. MLV II is being structured to acquire launch services more in concert with the commercial services being marketed by U.S. booster manufacturers. Obviously we cannot fully divorce ourselves from the build, assembly and test process for quality assurance reasons, but we are moving more toward a commercial services approach.

Senator THURMOND. How much of the production or launch capability now included in the DOD space launch recovery plans is excess to DOD requirements, and thus available to commercial access to space?

Mr. ALDRIDGE. We plan to increase ELV production and launch capacities necessary to meet DOD requirements. In some instances, the minimum effort necessary to meet our needs will result in excess capacity that could be made available for commercial launch opportunities. For the Delta/Delta II program, production and launch capacity is constrained to approximately 12 vehicles per year. During the early activation phase of the program, DOD requirements will use nearly all the capacity in the program. As the GPS program reaches full capability, some capacity becomes available for commercial Delta II launches. For example, in fiscal year 1989, seven Delta II and one NASA Delta launches are scheduled. Three commercial launch slots exist, but production capacity for only one new Delta II is available. As the Delta II program transitions to a steady state of 4–5 launches for Government needs in the mid-1990s, the excess capacity will be used by industry. There will be capacity for Titan III commercial launches at Cape Canaveral as well. We will work to make any excess capacity available for commercial opportunities but we will not do it as an expense to the Government or subsidy to industry.

[Whereupon, at 3:43 p.m., the subcommittee adjourned, to reconvene upon the call of the Chair.]

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